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A Sliding Scale Premium System

The Smaller the Wage, the Greater the Time Allowance—Whitcomb-Blaisdell Machine Tool Company's Method of Equalizing Production Cost

BY JOHN NELSON

The Whitcomb-Blaisdell Machine Tool Company, Worcester, Mass., manufacturer of metal planing machines and engine lathes, has developed a premium system which operates in conjunction with an excellent dispatching system to give results which, at no great cost of maintenance, are sufficiently accurate in all details. A radical departure from the accepted custom is a variation of the time allowances for a given piece of work in proportion to the sum of the workman's hourly wage and an overhead constant.

Following the usual method, the premium is based on the saving effected from the time allowed. But a great difference from established practice is the rule that the lower the sum of the wage and overhead, the greater the time allowed for a piece of work. If a boy receives 10 cents an hour and is allowed ten minutes in which to do a piece of work, a man receiving 30 cents an hour is allowed a shorter time. The company, in evolving the system, was influenced largely by a sense of fair play toward the workman and toward the foreman, who shares in the division of savings. However, another result of taking into account the factor of overhead is that an equalization is obtained, within close limits, in the cost to the company of the manufacture of a part, regardless of the hourly wage paid the operative, providing, of course, that the work is done within the time allowance. An arbitrary overhead charge, procured from the cost records, is added to the hourly wage of each man. The basis from which the ratio is reckoned is the time allowance of a 20-cent-an-hour man.

The Theory and Practice of the System

To take a fictitious overhead of 30 cents an hour (the figures used in the illustrations are all fictitious) this amount is added to the hourly wage paid the individual man. The 10-cent operative is charged up at 40 cents; the 20-cent man at 50 cents, and the 30-cent man at 60 cents.

On this basis the standard is 50 cents, that being the wage of a 20-cent man plus the overhead. In this case the ratio of time allowance of a 10-cent boy to a 20-cent man is 50 to 40, and of the 30-cent man to the standard 50 to 60. Therefore, a 10-cent boy receives $\frac{5}{4}$ of the standard time allowance and the 30-cent man $\frac{5}{6}$ of the standard time allowance. If this is 4 minutes, the 10-cent operative is given 5 minutes for a task, and so on. With a table, a portion of which is shown, which is carried through to a large time allowance, the efficiency department finds it easy to get the time for any task at any wage.

A man's premium consists of his rate of wages for one-half of the time saved from his time allowance. A 20-cent man doing in 3 minutes a task for which

he is allowed 5 minutes saves one minute for himself and one minute for the company. If he has 20 pieces in the lot he would save 40 minutes in an hour, and his share would be 20 minutes, or one-third of an hour's wages.

The individual premium record card, a sample of which is shown, is maintained in the company's records for each man. Upon this is the date the work of each order is completed, the order number and the lot number, the oper-

.20	.10	.125	.15	.175	.225	.25	.275	.30	.325	.35
28.	34.7	32.8	31.1	29.4	26.6	25.5	24.4	23.5	22.7	21.8
29.	36.	33.9	32.2	30.5	27.6	26.4	25.2	24.4	23.5	22.6
30.	37.2	35.1	33.3	31.5	28.5	27.3	26.1	25.2	24.3	23.4
31.	38.4	36.3	34.4	32.6	29.5	28.2	27.	26.	25.1	24.2
32.	39.7	37.4	35.5	33.6	30.4	29.1	27.8	26.9	25.9	25.

Character of Table in Record Book Giving Proportional Time Allowance for the Several Rates of Wages

Ord. No.	Part	Operation.	Allowances				
			13 in.	16 in.	18 in.	20 in.	24 in.
309	F Sliding Sh. Gear.....	Bore and sq.....	10.	12.	12.	14.	14.
		First spline.....	2.	2.5	2.5	3.	3.5
		Square and turn.....	10.	12.	12.	14.	14.
		C' bore.....	3.5	4.	4.	4.5	4.5
		Cut T.....	2.8	3.2	3.2	3.6	3.6
		Second spline.....	2.5	3.	3.	3.5	3.5
310	G Sliding Sh. Gear.....	Bore and sq.....	11.	13.	13.	15.	15.
		Airst spline.....	2.	2.5	2.5	3.	3.5
		Sq. and turn.....	11.	13.	13.	15.	15.
		C' bore.....	3.	3.5	3.5	4.	4.
		Cut T.....	3.2	3.6	3.6	4.2	4.2
		Second spline.....	2.	2.5	2.5	3.	3.
312	H Sliding Sh. Gear.....	Bore and sq.....	12.	14.	14.	16.	16.
		First spline.....	2.	2.5	2.5	3.	3.
		Sq. and turn.....	12.	14.	14.	16.	16.
		Cut T.....	3.2	3.6	3.6	4.	4.
		Second spline.....	2.5	3.	3.	3.5	3.5
314	Conn. Sleeve Gear.....	Chuck.....	8.	10.	10.	13.	14.
		Rear.....	3.5	4.	4.	5.	5.
		T. T. T.....	31.	42.	42.	53.	53.
		Mill.....	18.	24.	24.	30.	30.
		Grind.....	9.	12.	12.	16.	16.
		Cut T.....	3.5	4.5	4.5	6.	6.
		Mill Keyway.....	.....	.....	.....	.....	.....
	
315	Feed Rod Sleeve.....	Chuck and ream.....	2.5	3.	3.	3.	3.
		T. T. T.....	10.	12.	12.	14.	14.
		Spline.....	2.	2.	2.	2.	2.
		Mill Keyway.....	3.5	4.	4.	4.	4.
		Grind.....	8.	9.	9.	10.	10.
316	Top Shaft.....	Neck.....	17.	20.	20.	25.	25.
		R. turn.....	17.	22.	22.	28.	28.
		P. turn.....	17.	22.	22.	28.	28.
		Square.....	9.	12.	12.	16.	15.
		Thread.....	4.5	5.	5.	5.	5.
		Grind.....	28.	36.	36.	45.	45.
	

Character of Record Book Giving Time Allowances for Each Operation on Each Machine Part

in the time. Upon the return of the card to the office, the time consumed by the workman is computed and the premium determined, the man's wage rate being found in the pay-roll. The man's time is also checked up with the time of his preceding task. A chart is used for this purpose, having a horizontal column for each man by his number. The time of completion of each job is written in on the sheet, and when his next ticket is received the time of beginning of that job is checked up with the time of completion of the one preceding it, and a new entry is made. In this way no discrepancy in actual working time can go undetected.

Before an order goes to the manufacturing department the order tags are also filled out for every part. One of the three coupons is torn off and filed in the office, with the date of its dispatch to the works. The cards first go to the drafting room, where it is determined whether patterns are in good condition at the foundry, and whether changes in design may necessitate alteration; and in case

of steel, whether sizes have been changed. The tag calling for castings is sent to the foundry, and when the pieces ordered are ready for delivery the second coupon is removed and retained as a foundry record. The tag goes with the castings to the shop, where the count is verified and the parts delivered to their departments. There the third coupon is torn off and returned to the office, where

Size 16" Lot No. 75 Order No. 314	75-314	75-314	75-314
Article Connecting Sleeve Gear	No. Pcs. 100	No. Pcs. 100	No. Pcs. 100
For Dep't. E	B-139	B-139	B-139
No. Pcs. Ord. 100 Date Ord. Feb. 26, 1912			
Inspected By			
KEEP THIS TAG WITH WORK	3	2	1

The Coupon Order Tag, which Follows the Work. About 3 x 10 in. in size, with each coupon 1½ x 3 in.

Progress Sheet - 16" Lot 75									
A		B		C		D			
309 F. Sliding Sh. Gear	Done by Sp. Turner	1 st Splines	B. Bore but T						
310 H. Sliding Sh. Gear	Done by Sp. Turner	2 nd "	B. Bore but T						
312 H. Sliding Sh. Gear	Done by Sp. Turner	1 st "	but T						
314 Conn. Sleeve Gear	Chuck	2 nd "	but T						
315 Fred Rod Sleeve	Chuck	999	but T	Mill	Mill	Hand			
316 Top Shaft	Chuck	Splines 999		Mill	Mill	Hand			

The Progress Sheet, Showing Operations by Departments, of Each Machine Part

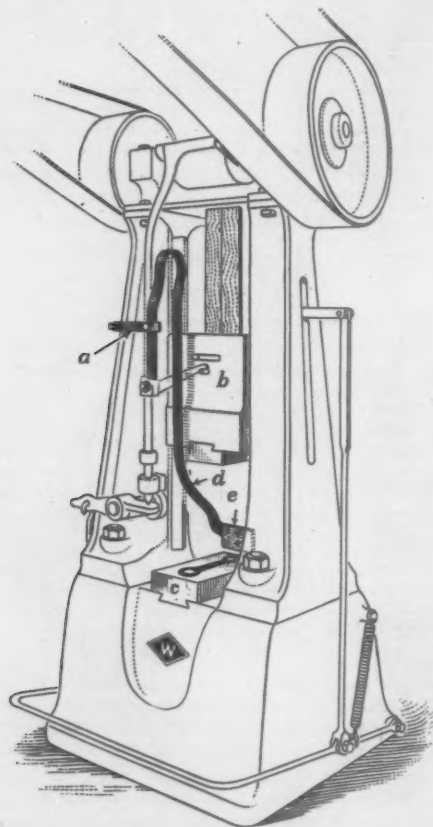
ORDER NO.	NAME OF PART	PATT. NO.	No. Used	QUANTITY	OPERATIONS	EXCEPTIONS	CUTTING-OFF SIZES
309	F. Sliding Sh. Gear	133	1		Bore & Sq. 1 st Splines Sq. & Turn B. Bore but T 2 nd Splines		
310	H. Sliding Sh. Gear	134	1		Bore & Sq. 1 st Splines Sq. & Turn B. Bore but T 2 nd Splines		
312	H. Sliding Sh. Gear	131	1		Bore & Sq. 1 st Splines Sq. & Turn but T 2 nd Splines		
314	Conn. Sleeve Gear	139	1		Chuck Bore Mill Grinding but T Mill Keyway	except 20" & 24"	
315	Fred Rod Sleeve	142	1		Chuck & Bore Bore Splines Mill Keyway Hand		
316	Top Shaft		1		Neck B. Turn Square Thread Hand		13" md 1 1/2" x 15 1/2" 15" md 1 1/2" x 18 1/2" 18" md 1 1/2" x 18 1/2" 20" md 2" x 20" 24" md 2" x 20"

it is charged up with the No. 1 coupon, and the date of receipt stamped upon it. The tag follows the piece through all its operations, and if an inspection is required, the name of the inspector is signed upon it. Certain parts, naturally, are taken from stock, and their cards go to the stock room, where it is ascertained whether the parts are available for the order; if not, an additional lot is secured.

A unique element of the dispatching system is the progress sheet. This contains a list of all the parts of an order, each having a horizontal column. The vertical columns represent departments and operations. The sheet is made out complete at the beginning of the manufacture of a lot of machines, all the necessary information being taken from the record books. The writing is in lead pencil. As fast as the premium work tickets are returned to the office, showing that the operations noted on them are completed, the work they represent is erased from the progress sheet. In this way a glance reveals the progress of an order through the works. A completely erased sheet means a completed order. It is a very simple and effective system.

Accident Preventer

For automatically preventing accidents in drop forging shops making what is known as precision products, J. H. Williams & Co., Brooklyn, N. Y., have developed an accident preventer. In the manufacture of drop forgings, which require little machining, the pieces are frequently furnished to gauge sizes and are restruck in forging dies, after the excess metal has been removed. The operator frequently when seating the forgings in the die impres-



A New Device for Preventing the Ram of a Forging Press from Descending on the Operator's Hand Which Has been Developed by J. H. Williams & Co., Brooklyn, N. Y.

sions by hand meets with serious injury on account of the premature falling of the ram. To avoid accidents of this nature a spring steel device is clamped to the guide or upright at the point *a*. When the ram *b* descends it automatically forces the hand of the operator to a place of safety, *c*, by its contact with the device at the point *d*, the force of the blow to the operator's hand being modified by the leather pad *e*.

The furnace of the Perry Iron Company at Erie, Pa., which went out February 7 for relining, was blown in March 4.

January Iron and Steel Exports and Imports

The report of the Bureau of Statistics of the Department of Commerce and Labor for January shows a decrease in our iron and steel exports and an increase in imports as compared with the figures for December. The total value of the exports of iron and steel and manufactures thereof, not including ore, in January was \$18,451,914, against \$22,186,996 in December. The value of similar imports in January was \$2,404,702 against \$2,305,267 in December.

The January exports of commodities for which quantities are given totaled 158,772 gross tons, against 189,752 tons in December. Details of the exports of such commodities for January and for seven months of the current fiscal year ended with January are as follows, compared with corresponding periods of the previous fiscal year:

Exports of Iron and Steel.

Commodities.	January		Seven Months	
	1912.	1911.	1912.	1911.
	Gross tons	Gross tons	Gross tons	Gross tons
Pig iron.....	8,663	10,798	62,331	96,474
Scrap	7,501	5,116	39,900	19,102
Bar iron	860	1,194	9,617	9,725
Wire rods	3,271	475	17,427	9,743
Steel bars.....	10,319	7,648	70,451	67,233
Billets, ingots and blooms...	12,779	11,731	111,205	62,430
Steel rails	24,445	43,127	216,439	205,675
Iron sheets and plates.....	12,931	9,009	92,327	57,274
Steel sheets and plates.....	17,122	12,224	145,323	101,584
Tin and terne plates.....	4,076	2,856	39,879	8,617
Structural iron and steel...	13,647	12,152	132,762	83,859
Barb wire.....	6,698	6,014	63,171	48,686
All other wire	8,888	9,307	74,918	55,844
Cut nails	593	916	6,698	5,802
Wire nails	1,994	4,485	27,587	26,510
All other nails, including tacks	653	782	7,059	6,459
Pipe and fittings.....	15,967	14,308	114,470	95,977
Radiators and cast-iron house heating boilers....	8,365	8,237	63,502	55,178
Totals	158,772	160,379	1,294,466	1,018,172

The imports of commodities for which quantities are given totaled 20,006 gross tons in January, against 19,084 tons in December. Details of the imports of such commodities for January and for seven months of the current fiscal year ended with January are as follows, compared with the corresponding periods of the previous fiscal year:

Imports of Iron and Steel.

Commodities.	January		Seven Months	
	1912.	1911.	1912.	1911.
	Gross tons	Gross tons	Gross tons	Gross tons
Pig iron	13,085	19,177	72,530	136,357
Scrap	624	303	6,743	15,711
Bar iron	2,055	2,601	14,588	18,820
Billets, bars and steel plates, n. c. s.	1,392	2,865	14,597	25,131
Steel rails*	208	....	1,814	....
Sheets and plates.....	265	292	1,475	2,672
Tin and terne plates.....	266	5,677	2,232	36,097
Structural iron and steel*..	352	....	1,948	....
Wire rods	1,759	2,156	8,425	11,668
Totals	20,006	33,071	124,352	246,456

*Included in "all other manufactures of" prior to July 1, 1911.

It will be observed that the heavy falling off in imports of tin plates in recent months showed no change in January.

The imports of iron ore for January were 154,118 gross tons, against 148,902 tons in December and 102,600 tons in January 1911. The total quantity of iron ore imported in the seven months of the current fiscal year ended with January was 1,163,082 gross tons, against 1,434,365 tons in the corresponding period of the previous fiscal year. Of the imports in January 106,040 tons came from Cuba, 36,956 tons from Sweden, 11,086 tons from Spain and 36 tons from other countries.

The total value of the exports of iron and steel and manufactures thereof, excluding ore, in seven months of the current fiscal year ended with January was \$142,243,391, against \$123,598,809 in the corresponding period of the previous fiscal year. The total value of similar imports was, respectively, \$15,471,950 and \$21,152,356.

The Permanent Manufacturers' Exhibit of Railway Supplies and Equipment has issued an attractively illustrated pamphlet descriptive of its quarters in the Karpen Building, Chicago. Invitations accompany this for the opening of the exhibit during the week March 16 to 23 inclusive. The exhibit will be continuous and permanent and quarters are provided for conventions and club rooms.

Power House Coal Handling Plant

An Interesting Equipment of a Factory Power Station at Oakley, Ohio

An interesting installation of coal handling machinery was recently made by the Alvey-Ferguson Company, Cin-

plants located at that point. The former method in getting coal from cars to the storage bins above the stokers of the boiler plant made use of a steam crane. The apparatus required the labor of seven men in operation, loading the container in the car and dumping in the bins.

The Alvey-Ferguson conveyor, now in use, is of the continuous bucket type, and an idea of its construction



View of Distributing Conveyor and Hoppers from Roof of Factory Power Company's Plant, Oakley, Ohio

cinnati, manufacturer of conveying machinery, for the Factory Power Company, Oakley, Ohio. The latter company furnishes power, heat and light to the several large

may be gained from the illustrations. The coal flows by gravity from gondola cars into bins of 40 tons capacity under the car. From these it is received by the traveling buckets of the elevator and elevated to a spiral conveyor which distributes the coal to any of the eight coal hoppers of the power house. From these hoppers, or storage bins, the coal is received by automatic stokers as stated. No labor whatever is required in handling the coal from cars to stokers, with the exception of a man to open the trap doors in the bottom of the gondola cars. A small motor suffices for operating the elevator. While the full capacity of the conveyor has not been employed, a recent record was made of unloading and conveying 55 tons of coal to the storage bins in 45 min. working time, and this performance is naturally mentioned to indicate that the saving in time and labor should alone pay for the cost of the installation in a short time. The rapidity with which the coal can be handled is calculated to insure against coal shortage under extreme conditions, besides increasing the facilities of the power plant. The light structural work sufficing to support the apparatus and its enclosure, or weather protection, is shown in the pictures.

The annual exhibit of the work of the evening classes in Pratt Institute, Brooklyn, N. Y., will be held on Friday evening, March 22, from 8 to 10 o'clock, and is open to the public. The Institute offers courses for both men and women in drawing and design, applied art, applied science, sewing, dressmaking, millinery, household arts and various mechanical trades, and this exhibit affords visitors an opportunity not only of viewing the work of the students in the various courses but also of inspecting both the results and methods as well as the equipment and general facilities of the school for conducting this kind of industrial training.

Ruttenberg Brothers, scrap iron and metal merchants, Reading, Pa., have taken possession of their new plant located at 119 South Second street, and now have materially increased facilities for the handling of old material.



View of Conveyor Leading from Bins Under a Coal Car

Selecting the Light for the Foundry*

The Special Problems of Lighting for Molding, the Choice of Type of Lamp and Amount and Distribution of Illumination

BY B. G. WORTH†

The ideal light is light of good intensity but of such uniformity as not to produce glare and coming from a sufficiently definite direction to produce good shadow effects. We have effects such as these with northern day light admitted through windows. To produce a lamp having in itself effects approximating the ideal has been the endeavor of inventors for many years. Unfortunately up to the present time no lamp has been developed which will satisfactorily fulfill all the conditions except the vapor lamps, and these are not well adapted for foundry work.

General Classes of Lamps

There are three kinds of lamps to be considered: the incandescent, the arc and the vapor lamps. Of the incandescent lamps there are the ordinary carbon, the metallized carbon (Gem), the tungsten (or Mazda), and the Nernst lamp. Of the arc lamps there are the enclosed carbon, both alternating and direct current, the long burning flame arc and the luminous arc. The vapor lamps, that is, the Cooper Hewitt and the Moore lamps, are not considered adapted to foundry lighting because of the lack of penetrative power of their light due to the low intensity of their light sources. This characteristic, however, as well as others, make them most desirable for nearly all other work. A high intensity mercury vapor lamp known as the quartz lamp is now on the market, but can hardly be considered a practical illuminant as yet. The accompanying table gives data of various lamps.

For purposes of comparison lamps are rated in mean hemispherical candle power (abbreviated as mhscp), which is the average light thrown off in the lower hemisphere. To make comparisons of any value they must be made with the globes on the lamps and with all conditions under which the lamps will be used. The efficiency of lamps is measured in watts consumed per mean hemispherical candlepower of light given. The cost of lighting includes the power, cost of renewals and interest on the cost of the lamps.

The Object of Reflectors

It must not be assumed in considering lamps that the employment of one lamp having a mhscp equal to a certain number of other lights would give the same amount of illumination as if that number of other lights were employed. This is sometimes so, but not always, or in fact usually. The only light which is useful is that which reaches the eye, and before it reaches the eye it must reach the objects which reflect it to the eye and which it is desired to see. Now usually the large source would produce a small area of high illumination shading off into a large area of lower illumination, whereas the large number of units would produce a more even illumination, other things being equal. To correct this condition and also to bring down all light in the upper hemisphere so it becomes useful in the lower hemisphere efforts have been made to devise shades which will distribute the light so that only a small portion will be delivered in the vicinity of the lamp and a large portion delivered at a distance from the lamp, and thus the illumination be made more uniform. This arrangement works very well up to a certain point, but as the spacing of lamps increases without its being possible to increase the height the rays of the lamp begin to get too oblique, and even these arrangements cannot correct the fault.

Another object of shades is to correct glare by cutting down the intensity of the light source. It is obvious that if the light from the lamp is allowed to impinge on a shade which does not give an exact reflexion, but breaks up and diffuses the light, the intensity of the light as far as the eye is concerned will be much lowered and will not produce

glare. Many shades of this type are available, made of neutral colored glass and other materials such as do not reflect light directly, but break it up and cause it to diffuse.

Light Requirements of the Foundry

Coming from general consideration of illumination to the specific requirements of foundries, it may be said that foundries require light principally for two operations, molding and pouring. The molding requires considerable light and takes place usually in the early hours of the day when day light is available. The pouring comes at the close of the day and requires only sufficient light to see to get around, which works in very nicely with the diminishing light of the afternoon. So, regarded from some aspects, the lighting in a foundry is rather unimportant, and in fact sometimes there is practically no lighting installed. However, it must be remembered that rainy days come, that it is sometimes essential to work overtime, and that in the winter it does not grow light until after the foundries are started, and evening darkness also comes very early.

It is a great deal cheaper to make good molds in the first place than to repair castings after they have been molded, and it is a fairly difficult matter to make a good mold unless there is sufficient light. Of course, these considerations apply only in a general way to different foundries. For heavy work a minimum of light will suffice. When you come down to very small castings a good deal of light is necessary. Building up the molds, smoothing them off and finishing them generally requires good light. Molding work is very difficult to see because of the dark color of the sand and the general blackness of everything concerned. This darkness absorbs the light and very little is reflected. Moreover, as the walls and objects do not reflect light there is very little diffusion and the lighting effect is less for a given quantity of light supplied from the lamps than it would be if there were diffusion.

Accidents and Insufficient Lighting

It is a dangerous matter to try to pour in the dark and when men are running around with ladles full of metal and cranes operating overhead, accidents can be very serious. As bearing on this I wish to mention a curve given in a paper by John Calder before the American Society of Mechanical Engineers. This curve shows in a remarkable way how the percentage of accidents increases greatly in the darker weather of the year, the inference being that this increase is due to the decrease in illumination. According to this curve there are about 75 accidents in December or January as compared to about 50 in July or August, or 50 per cent. more in the dark months. Statistics have also been published which show that in the United States alone 500,000 preventable accidents take place every year. Of these it is believed by the authorities who have made a study of safeguards for the benefit of employees that 25 per cent. are caused by poor illumination.

A foundry is always more or less full of dust, dirt and smoke, and to penetrate through this murk requires, of course, more light than would be necessary otherwise. Lamps of high brilliancy are required. This is the reason why vapor lights are not available, as it has been found that light from lamps of this type does not penetrate readily through smoke and dust.

Foundry lighting must not be too uniform in its character as shapes of molds are difficult to see due to the darkness of the material and the consequent fact that shadows are not so apparent as on lighter materials. If the illumination is too uniform the mold will appear flat. Again molds contain deep recesses into which the light must penetrate, and unless there is considerable direction to the light rays it will fail to penetrate into the interior of the mold. This condition is more or less opposed to the con-

*From an address on "Practical Foundry Lighting," delivered before the Newark Foundrymen's Association, Newark, N. J., March 1.

†With Walter Kidde, engineer contractor, 140 Cedar street, New York City.

dition requiring shadows, as the rays should be oblique to make shadows and should be vertical in order to see the inside of the molds. There must be a compromise between these two requirements.

Another thing which must not be lost sight of in a foundry is the effect on the lamps of dust and gas. If the lamp contains an elaborate mechanism, then the gases and dirt are liable to affect this mechanism and the lamp will not be always in working order. If it has a complicated system of shades, or diffusers, these become dirty and a large part of the light is cut off.

Foundry lighting therefore requires a good and possibly concentrated illumination for molding purposes, and on the other hand a general illumination for pouring, which latter must be of a character to penetrate through the smoke. These two requirements are more or less contradictory, and it must be decided which is the more important. This brings into the matter the question of costs.

The best way to get a good illumination is by general lighting of a high character, and then this is naturally also available for pouring purposes. On the other hand, a general illumination of a high character is expensive. If it is not desired to spend much money. This can be done by a

candle power capacity necessary. One is the flux of light method and the other is the step by step method. The first involves the calculation of the total amount of light required by multiplying the area by the illumination required and reducing same to lumens (the lumen being the quantity of light necessary to illuminate 1 sq. ft. to an intensity of 1 ft. candle), then figuring the necessary number of lamps required to supply this number of lumens from tables which have been worked out in detail and which take into account the reflection from the walls, the absorption loss, etc. For standard work which duplicates conditions which have been experimentally studied this is a quick, accurate and sure method. But for foundries the conditions vary too much to depend upon this method except as a check. Again, if there are only a few large units the flux method cannot be used because it does not give any data as to the distribution of light.

The point by point method is in my opinion the best for foundry work. This method consists in assuming a certain arrangement of lamps and certain positions or stations in the foundry, and calculating the illumination at each station. These calculations, although tedious, are easily made from the distribution curves of the lamps in question.

Table of Approximate Values of Efficiency, Life and Costs of Various Electric Lamps.

Type.	Size.	Rating, Mean Hemispherical Candle Power.*	Efficiency, Watts per Mean Hemispherical Candle Power.*	Life in Hours.	Color of Light.	Cost per Mean Hemispherical Candle Power in Cents.			Sizes Available Mean Hemispherical Candle Power.
						First Cost.	Renewal per 1000 Hr.	Current per 1000 Hr. at 5c. per Kilo-watt-hour.	
Carbon	32 C.P.	26	3.85	500	Reddish-White	1.04	2.08	19.25	6- 26
Gem	250 W.	91	2.75	800	Orange-White	0.88	1.10	13.75	20- 100
Tungsten	250 W.	160	1.55	1300	Yellow-White	1.75	1.35	7.82	10- 350
Nernst	264 W.	220	1.20	800	Almost White	3.18	0.17	6.00	75- 220
Enclosed Arc	a.c. 7 A.	275	1.80	90	Bluish-White	6.55	0.32	9.00	150- 275
Enclosed Arc	d.c. 6.5 A.	510	1.40	90	Bluish-White	2.95	0.17	7.00	275- 510
Flame Arc	d.c. 10 A.	1200	0.40	100	Yellow	4.17	0.17	2.00	1000-1750
Flame Arc	d.c. 6.5 A.	1750	0.40	100	Yellow	1.88	0.11	2.00	1000-1750
Luminous	d.c. 6.5 A.	1325	0.54	100	Almost White	1.96	0.045	2.70	800 & 1325
Cooper-Hewitt	d.c. 3.5 A.	800	0.48	2000	Bluish-Green	2.50	0.84	2.40	300- 800
Cooper-Hewitt	a.c. 7.2 A.	800	0.50	2000	Bluish-Green	2.81	0.84	2.50	800 only

*Note: These values include glassware.

fair general illumination provided in the first place, and then special localized illumination provided where it is required for good work. This compromise is not altogether satisfactory, because practically the only way to provide the special illumination is by the use of extension lamps. These are a nuisance, as they clutter up the floors and wear out rapidly, and are always a source of trouble and maintenance. If capital is available it is much better to provide a general illumination.

Determining the Amount of Illumination

The amount of illumination required ranges from about $\frac{1}{2}$ ft. candle to 3 ft. candle. One-half foot candle is very low and is just sufficient to enable large work to be carried on. On the other hand 3 ft. candle is very good illumination and would be sufficient under certain circumstances for a reading room. Such good light may be considered extravagant, but it is not in fact because light goes a great deal farther in a reading room, due to the good conditions, than it does in a foundry.

Somewhere between the two extremes is the proper amount, and this must be determined by the character of the work. For foundries working on large heavy castings where finish of the mold is of not much importance, about 1 ft. candle should be sufficient. On the other hand, in foundries casting small objects requiring great detail and careful finish of the mold 3 ft. candle is none too much. This question of the amount of illumination is one of the most vital points to be considered, inasmuch as it determines the cost of installation and operation of the whole system. No rules can be given by which it is possible to determine how much light is needed. The workman naturally wants as much as he can get. The owner wants to hold the expense down as far as compatible with good efficiency in his workmen. It must boil down in every case to a question of judgment to be decided by the owner and his engineer after due study and investigation by actual personal inspection of plants in operation, the characteristics of which can be ascertained. In other words it is a matter of arbitrary decision and not of scientific deduction.

There are two methods of getting at the amount of

Of course this method involves considerable labor because several tentative plans must be worked out. After working out these plans, however, it will be possible by inspection to decide just about what is wanted and a result which will be suitable can be had.

Location and Selection of Lamps

Lamps of necessity must be hung above the crane in order to permit its operation, and for this reason it is not feasible to use small units, as the number required brings the cost per unit of light up very high. Thus it works out that in general high-power lamps, such as arcs, can be used to the best advantage. These lamps, in order to avoid glare and secure good distribution, should be hung very high. As it is difficult under these circumstances to clean and adjust lamps, the cost of trimming becomes serious unless a long burning lamp is used. The flame arc is probably the most efficient solution of the foundry lighting problem. It is the most efficient source of lighting known. It can be used on both alternating and direct current. Certain makes are suitable for multiple work, i. e., each lamp can be operated separately and controlled. Its light has penetrative power. The only objection of the lamp is that its mechanism is more or less complicated in the types which have the highest efficiency. Some less efficient types, however, have mechanism which is the acme of simplicity. While flame lamps throw off a certain amount of gas, this is of no consequence in a foundry and can be neglected.

It is well, of course, always to use a highly efficient lamp if it can be done. Sometimes the employment of the highly efficient lamp seriously cuts down the efficiency of sight because of the impossibility of installing it in such a way as to prevent glare. In this case it would be better to use a unit which is better adapted to the circumstances and which has a lower efficiency in itself which, by making the efficiency of sight higher, will in the end produce a better over-all efficiency. Of course, where either type of unit can be used with good efficiency of sight, the more efficient light source should be employed.

In some small foundries and in old ones where the ceilings are not high it will be impossible to use the flame lamp because it is of a size which needs to be hung high

to get the distribution. These foundries must come to a smaller unit. The flame-arc lamp because of certain inherent features cannot be constructed in very small units, and it then becomes a choice between a luminous arc lamp and an incandescent. The luminous lamp is midway between the flame and the incandescent and has all the good qualities of the flame lamp, except its mechanism is more complicated, and it cannot be used on alternating current.

Of incandescents there are the Nernst and the Mazda lamps. While the Nernst lamp has a higher efficiency than the Mazda, I do not feel that it is so well adapted to foundry work as the Mazda. This latter, since the introduction of tungsten wire filaments, has become very reliable. The carbon incandescents, due to their low ratings, are hardly adapted for general illumination except in certain circumstances.

Piece-Work and Premium Systems

BY FRANK RICHARDS

The editorial upon "The Piece-Work Wages System," in *The Iron Age* of February 29, and current discussions in various publications upon so-called "premium" and "bonus" systems, impress upon me anew the fact that the "true inwardness" of these latter is not generally understood, and I am moved to submit the following for the consideration of scientific management experts and others who may be interested. I speak here only of the premium plan, the other so-called plans being merely modifications or outgrowths of that and retaining the features of it which seem to me to be insuperably objectionable.

Of the absolute rectitude of intention of Mr. Halsey, who originated the system, no one is more assured than I, and those who advocate it are also evidently believers in it. Nevertheless, it is as it is, and when it comes up I think it my duty to present the estimate of it which I can claim to hold with equal honesty, and which, in the interest of exact justice and of ultimate business expediency, may equally demand to be considered.

Too Good a Name

The premium plan started out with a name too good for it, and to which, as I will try to make appear, it is not honestly entitled, but which probably more than anything else has helped it to secure the consideration it has received. It happens that the premium plan has found its chief, if not its entire, adoption in the machine shop or in trades closely allied, and even in these it has not made the progress which might have been expected from its 20 years of life and the strenuousness of its advocacy. In railroad shops piece-work prevails quite generally, and I have reason to believe that in those shops alone the amount of wages paid under that system equals or exceeds all that is paid under the premium plan in the entire country.

It is a curious thing that while in a few instances the premium plan has superseded day wages, it has in no case within my knowledge taken the place of piece work where that has been the established habit; and this might have been expected, for the premium plan looks vastly different as it is approached from opposite sides.

In its proposition to the day worker it has an apparent warrant for its assumption of gratuitous beneficence. The case is like this. In a shop it generally comes to be understood, or it is settled in some way, that there is a certain amount or quantity of work in some special line which shall be considered a fair day's work, the employer receiving in results just the value he pays for, and the workman being fairly paid for what is done. The work must naturally be repetitive, or of such a character that the quantity done may be measured, counted or otherwise precisely determined.

It is assumed or understood that the workman, while honest enough as men go, in doing this amount for his day's work has not overexerted himself, or done really all that he is capable of doing. The employer, therefore, being naturally desirous of getting as large an output as possible from his working plant and each individual constituent of it, proposes to the workman that if he will strenuously exert himself and show increased results per day or hour, his work shall be counted or measured up each day and the wages for all that he does in excess of the "fair day's work" shall be computed at the same rate as for the rest, and he shall receive one-half of this excess of wages so earned as a premium for his extra accomplishment. There surely can be no question that this is a bona fide premium plan, and little question either as to the willingness of the employer to engage in such beneficence, where it can be made to work.

Examples of the Premium Plan

That there may be no misunderstanding in the case, and no suspicion of misrepresentation, we may take a concrete example. Say that in a certain shop they have begun building a newly patented stop-valve, which has "caught on" and is now beginning to be in demand, so that it will have to be made in large numbers. The assembling of the valve has been done by day work, a \$3 man putting up, say, 18 for a day's work, so that the labor cost has been 16 2/3c. each. Now, when it comes to making either a premium plan price or a piece-work price, the practice is first to "shade" the day-work price a little to make a base to start from; so that it will probably be proposed in this case to make the day's work 20 pieces at 15c. each, which will make even money, you know, and assure the man his regular daily wages to begin with. The premium plan proposition then is that for any number of valves which the man may put up over the 20 he shall be paid 7 1/2c. each, so that if he puts up, say 30 instead of 20, he will get his \$3 for the 20, and 75c. premium for the additional 10.

That is the premium plan as applied to day work; now let us try precisely the same proposition in, say, a Troy collar shop, where all the work is strictly by the piece, and look for the premium in that case. Here are thousands of girls stitching collars, and, while claiming to be absolutely ignorant of the prices actually paid, that will not prevent us from assuming any figures which may be convenient. Say that the price paid for a certain line of stitching is 2c. per dozen, and that the average work of the room for each girl is 75 dozen, or \$1.50 a day, some doing perhaps a third more than that, and when they turn in 100 dozen getting of course \$2 for the day's work, or 50c. more than the average, and no thanks to any one but themselves.

Now, the employer having fixed upon 75 dozen as a fair day's work, he has all the data necessary for proposing the premium plan to the girls. They are to be told that they will be paid \$1.50 per day as before, with the understanding that they shall stitch 75 dozen, and then if they do 100 dozen in a day they shall receive, in addition to the \$1.50, a premium of 25c. (instead of the 50c. by piece-work), and in the same proportion for any other number in excess of the 75 dozen. What chances are there that the girls will be able to recognize the premium feature of the case?

With a little knowledge of the habits of Troy collar girls, I would much prefer that the advocate of the premium plan should make his proposition in the starching room instead of in the stitching room, and then I would like to snapshot him as he came out. The picture would suggest what the premium plan looks like from the piece-work side.

Of course no one has ever had the hardihood to actually propose the premium plan to the Troy collar girls, nor to the glove workers of Gloversville, nor to the hat makers at Danbury, nor in the knitting mills of Cohoes, nor in the textile mills of Lowell and Lawrence and Fall River, nor among the garment workers of the East Side of New York City; yet the "industrial engineers" find it safe to propose it to machinists anywhere!

The Non-Cutting of Piece Prices

With my view of the premium plan, I of course can have no interest in knowing how it has actually worked in some cases in practice, and I care as little what trades unions may think of it. There is one point, however, which is worth speaking of. It is held as a special merit

and a distinctive feature of the premium plan that there shall be no cutting of prices or premiums when once fixed on any line of work. This is equally applicable to piece work, and it has sometimes been promised, but there is no guarantee in either case, and it may be assumed that the same human nature which cuts piece-work prices will also find occasion for "revising" premium plan schedules. That there is little record of such breaches of faith must be largely due to the fact that the premium plan has been so seldom continuously used.

I can tell from personal experience of a remarkable instance of good faith in connection with a long-continued piece-work job. In the early 70's I was a journeyman machinist at the Starbuck Iron Works, Troy, N. Y., and in the same shop also was working F. F. Hemenway, who later was for several years editor of the American Machinist. George W. Richardson had developed in Troy the original pop safety valve for locomotives, and Hemenway had been of assistance in experimenting and in making it a practical success. Richardson came to the Starbucks and made arrangements for the manufacture of the valve in quantities to be supplied to locomotive works, which were beginning to adopt them. He stipulated in his contract that Hemenway should do the work, that he should be paid a good piece-work price, and that no matter how big his earnings the piece-work prices should never be cut. The valves were made in lots of 100, and Hemenway was paid 60c. a piece for them.

After working for a time and getting tools and methods all right, Hemenway finally succeeded in doing all the work on the valves complete at the rate of 100 a week, earning \$10 a day, and after that he never fell behind this rate for the two or three years that the job lasted. The valves were then going off at the rate of 300 to 400 a month, but later some of the locomotive works got licenses to make the valves, and the job fell off, so that the average demand was between 100 and 200. Then Hemenway became foreman of the shop and I succeeded to the valve job, still without any cut in the price, and I held it a couple of years until Richardson had a shop of his own, and the Starbuck contract ended. The premium plan certainly could never keep better faith than that. I may say that several times I had other good piece-work jobs, and what my hand found to do I did with my might, and yet no piece-work price of mine was ever cut.

An example of an actual bona-fide premium proposition, which the present writer is not advocating as generally practicable, but which is very different from the pseudo-premium plan spoken of in the preceding paragraphs, was given by W. O. Webber, in the Engineering Magazine for October, 1910. He says:

At the Blank Car Wheel Works, we paid \$1.80 for 12 blocks fitted into tires per day; this was at the rate of 15 cents per block. I offered the man \$2 for 13 blocks per day, which is at the rate of 15.4 cents per block. He jumped at the proposal and as soon as he became expert at that I offered him \$2.50 for 15 blocks per day, which is 16.66 cents per block. This he thought was very liberal, but we had increased our output 25 per cent, and although the accompanying total increase of wages was 39 per cent there was no extra general cost.

By straight piece work this man would have been paid for 15 blocks per day (12 being a day's work): $(12 \times 15) + (3 \times 15) = \2.25 per day. By the pseudo-premium plan he would have been paid: $(12 \times 15) + \frac{3 \times 15}{2} = \2.025 per day.

The Lansing Company, Lansing, Mich., has purchased the entire hoist machinery plant of the Butcher & Gage Company, Jackson, Mich., and in the future will manufacture the Wolverine hoists in Lansing. The standard hoist is a single drum contractors' hoist capable of moving a 3000-lb. load 55 ft. per min. The Wolverine hoists are not only used by contractors and miners, but also for loading, unloading and pulling cars; loading and unloading boats at docks; ditching and dredging with scrapers; pile driving and well digging. They have a friction clutch and gear with cut teeth for hoisting and a reverse motion at twice the speed of the hoisting and are equipped with engine gear for either 3, 4 or 6-hp. engine, as ordered.

The Work of Efficiency Engineers

Unsatisfactory Results Reported by Cleveland Metal-Working Firms

The employment of efficiency engineers in the metal-working shops in Cleveland has not proved entirely satisfactory, according to reports made to the Cleveland branch of the National Metal Trades Association. Within the past year about 15 Cleveland companies belonging to the association engaged outside experts to aid them in developing plans for the more scientific management of their shops. In a number of cases after employing outside experts the manufacturers finally entrusted their efficiency work to members of their own organizations and the latter secured good results. The annual report of Philip Frankel, secretary of the Cleveland branch, which was made at the annual meeting March 7, says on this subject:

"In the past year, at the request of some of our members, we made an investigation regarding the employment of efficiency engineers in the metal working establishments in Cleveland. I refer to the employment of outside experts to rectify or remedy so-called existing ailments or to lessen production costs, standardize methods of production and matters of a similar nature. To our surprise we learned that from a great number of experts so employed by different factories in Cleveland the results have not been what were anticipated. The results of our investigation cannot be better expressed than by making extracts from a letter from a manufacturer, this being one of many received:

"We beg to state that our experience with outside efficiency engineers has been on the whole unsatisfactory, and we are impressed that an efficiency campaign or programme should not be undertaken in the average factory, except with efficiency men who are permanent members of the factory organization. In the case of our own business we have entrusted all efficiency work to members of our permanently employed staff. The results seem to indicate that this is by far the better way to promote efficiency measures."

Experience of the Railroads

The Railway Age Gazette has been discussing editorially some of the results of employing efficiency engineers by various railroad companies. Reference is made to special reports made by experts who had been employed to recommend changes in methods. In one case the recommendations were so indefinite and stated in such general terms that the officers of the roads, after careful study, were forced to the conclusion that they had no practical application. In another case the representatives of the engineers made very elaborate reports, going into considerable detail, but only in one instance, and that an unimportant one, were their recommendations practical. On the other hand, several defects in the organization and in the shop equipment, which were more or less obvious to the men in charge, but which they had not been able to remedy because of lack of funds, were passed over and were not even noticed by the efficiency engineers.

While admitting the room for an improvement in the methods and almost any department of the railroads, it is stated that the men in charge believe that the best results will be accomplished, not by outsiders, but by experienced men trained in railroad work. As an instance of this they point to the excellent results obtained in the mechanical department of the Illinois Central recently, where a lowering in costs was brought about coincident with a great improvement in the condition of the equipment. This work was directed by a new superintendent of motive power who had been trained in a twenty-five years' course on various railroads.

The Ellwood Ivins Tube Works, whose mills are at Oak Lane Station, Philadelphia, Pa., reports good business and its plant running full time. The company has recently added chrome tool steel tubes to its line of seamless low carbon steel tubes and tool steel tubes. The tool steel tubes and the chrome tool steel tubes are used very largely for roller and ball bearings and for many purposes where tool steel bars have been bored out. They are also used for drills for all purposes. Seamless cold drawn chrome tool steel has been heretofore considered impossible to produce.

A Sturtevant Motor for the Air

The B. F. Sturtevant Company's Production for the Aeronaut Designed for Strength as Well as Lightness

The policy adopted by the B. F. Sturtevant Company, Hyde Park, Mass., in developing a new aeronautical motor, has been to perfect a type which will operate continuously for periods of 12 hr. or more under full load without requiring lubrication or adjustments, and one that will operate for extended periods when inclined at an angle. The aeroplane has progressed to a point where reliability, strength and durability of motor construction are considered more important than lightness. The weight of this motor has been reduced only in the design and in the use of the strongest materials and in no case has the necessary strength been sacrificed. The motor conforms to the best standards of the stationary type and is a four-cycle gasoline engine with either four or six cylinders arranged vertically. Figs. 1 and 2 are exterior and sectional views of the motor, while Fig. 3 shows the geared pressure pump which forms a part of the lubricating system.

A specially interesting feature of the motor is the lubricating system. It is pointed out that service in an aero-

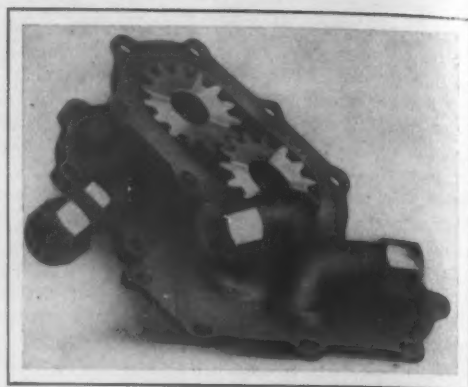


Fig. 3—The Geared Pressure Pump Forming a Part of the Lubricating System

oil flows to the bearings through a series of passages cast in the base, no piping being used. The lubricant enters the hollow camshaft at the main bearings and is conducted to the arms of the crankshaft through the connecting rod bearings. The oil flying from the crankshaft fills the crank case with a fine spray covering all the moving parts and eventually falling into the sump. A second

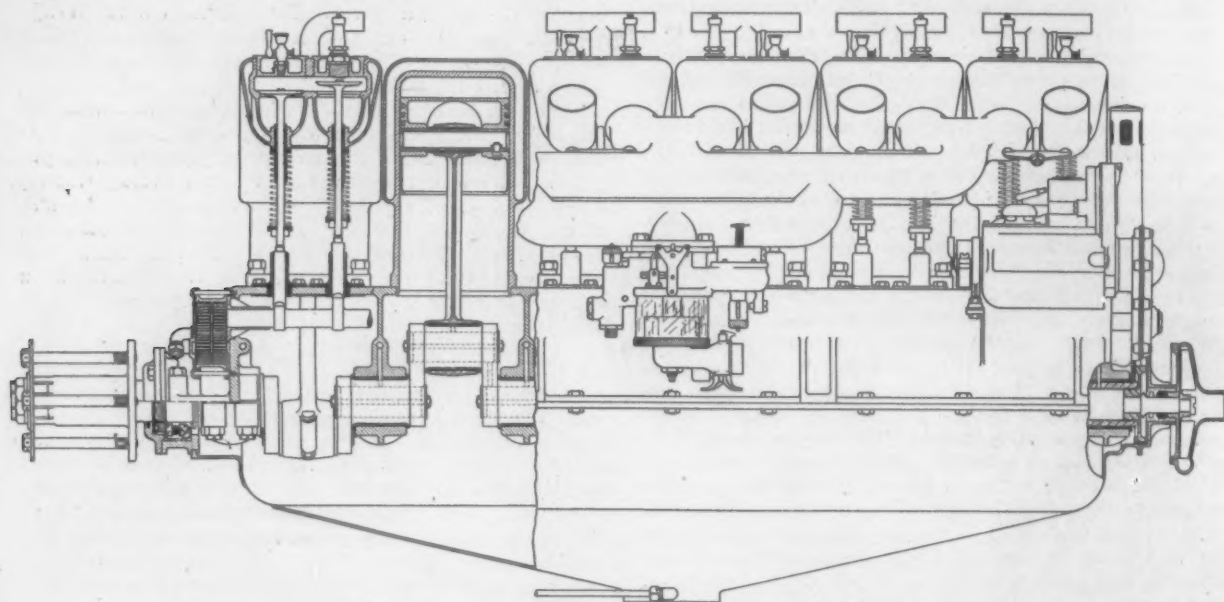


Fig. 2—A Sectional Elevation Showing Constructional Details

plane calls for the severest requirements and no hand oiling should be necessary, nor should grease cups be used. In this engine a large quantity of cool oil is supplied to all bearings under a pressure of 20 lb. per square inch, which is maintained by a gear-driven pump attached directly to the end of the camshaft. From the pump the

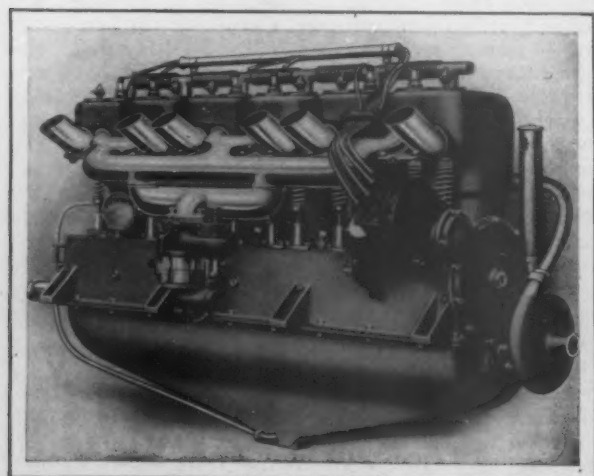


Fig. 1—The New Six-Cylinder Aeronautical Motor Developed by the B. F. Sturtevant Company, Hyde Park, Mass.

gear pump arranged in tandem with the first one takes the lubricant from the sump and forces it through a filter into the oil tank, where it is cooled before being used again. The designers, it is stated, have found that this system permits the use of a more efficient filter than was possible with the suction type, as it eliminates the danger of its becoming clogged and stopping the oil supply. If such clogging should occur, the pump would furnish enough pressure to burst the filter. The filter is easily accessible and may be removed quickly for cleaning without disturbing the oil. The oil pan or sump which forms the lower part of the motor is a very light aluminum casting, the only function of which is to catch the oil as it falls from the base. It is so constructed that the motor may be operated at an extreme angle without overlubricating either the forward or the rear cylinders. The tank, which is regularly fitted to the motor, holds enough oil for 3 hr.

The cylinders are of the L type with exhaust and intake valves on the same side and integral water jackets. They are cast of a special semi-steel mixture from a crucible and have a tensile strength of 40,000 lb. per square inch. After being machined they are tested with a hydraulic pressure of 600 lb., after which they are heat treated and ground. The piston, which is also of semi-steel, is ribbed to secure strength and lightness and has three rings.

The crankshaft in the four and six-cylinder motors is supported on five and seven bearings respectively, which

are fitted with interchangeable die-cast bushings of Parsons white brass. The cylinders and all exposed parts are heavily nickel-plated to render them water-proof.

The two types of motor are guaranteed to develop 40 and 60 hp. respectively at 1200 r.p.m. and this rating is conservative as the four-cylinder motor has shown 52 hp. on a dynamometer and 375 lb. thrust with a $4\frac{1}{2}$ -ft. pitch propeller running at the regular speed. The cylinders have a bore and a stroke of $4\frac{1}{2}$ in. The ignition current is furnished by a Mea magneto and the carbureter is of the Stromberg Motor Devices Company's standard type. The complete weight of the two motors including the magneto, carbureter and the oil tank are 280 and 285 lb. respectively.

Process in Roll Crushing*

BY C. Q. PAYNE

The art of crushing ores and other materials by rolls is a comparatively recent one. While the first record of rolls using iron crushing surfaces dates back to 1806 when they were employed in Cornwall, their principal development has taken place during the last 30 years. Having had the problem of fine granulation in mind for some time past in its relation to the treatment of certain classes of ores, I have found in a recent design of rolls by J. S. Frazee that he has completely overcome the obstacles which have heretofore prevented the satisfactory operation of rolls when used for fine crushing. The bearings of the roll shaft are supported in cast-iron frames without tension rods, the frames being held together by staybolts and lock nuts to permit the width between them to be adjusted slightly when the rolls are in place. This construction is lighter and less expensive than the single bed plate or frame and the rolls can be boxed in a wooden housing. The four babbitt-lined bearings, which are of the solid type, have dust caps at each end and are movable in guides in the frames. Two of these bearings are held against a spring pressure and the other two against screw adjusting bolts which regulate and control the space between the roll faces. These adjusting rolls have sprocket wheels and an endless link chain. The adjusting screws can be moved in unison when



Fig. 1—A 12 x 14-in. Roll Shell Mounted Upon Its Shaft and a Flanged Roll Shell of the Same Original Size Worn Down to $6\frac{3}{4}$ in. in Diameter, Its Surface Being Maintained Cylindrical Without Any Machine Work Having Been Expended Upon It

varying the position of the roll space by inserting a long handled spanner in either of the sprocket wheels.

One of the essential features of the design consists of making one roll shell longer than the other to permit flanges to form on it between which the shorter roll revolves with a slight clearance, the rolls being fed from a hopper. The material falls from the hopper upon a feed tray which conveys it to the space between the rolls. This tray is given a slight rotary movement. It has been a common experience that as rolls are usually fed the roll shells will groove and wear more rapidly at their centers than at their ends, due to a difference in the rate of flow of the feed stream or to a greater mobility of the feed stream in certain directions than in others. With this arrangement of rolls it is found that these difficulties can

be overcome by regulating the sectional shape and area of the feed stream as well as the amount of material fed.

The flanges on the longer roll shell perform two functions. They not only confine the feed stream at its end and prevent ridges from forming at the ends of the unflanged roll shell, but by carrying the feed stream a slight distance beyond the end of the shorter roll shell a small amount of crushing is performed between the sides of the flanges and the ends of the roll shell, this crushing overcoming all tendency to produce end thrust of the shafts against their bearings. In this way it is possible to maintain the roll faces parallel regardless of the hardness of the material being crushed and to keep the rolls in continuous operation until the roll shells are completely worn out.

Figs. 1 and 2 illustrate the effect of Mr. Frazee's invention in connection with 12 and 24 in. roll shells in keeping their surfaces cylindrical until the roll shells are com-



Fig. 2—A Pair of Worn Out Roll Shells Originally 24 in. in Diameter and Reduced to $19\frac{1}{4}$ in. in Diameter by Wear Alone, Placed Above a Pair of 24-in. Steel Roll Shell Castings

pletely worn out. The 12-in. roll shell in Fig. 1 has been reduced to $6\frac{3}{4}$ in. in diameter and the larger shell illustrated in Fig. 2 has been reduced to $19\frac{1}{4}$ in. in diameter, leaving only $\frac{5}{8}$ in. of metal at the edges. At their centers the rolls are somewhat thicker, owing to the beveled inner surfaces required to mount them upon their coned centers. A pair of 24-in. crucible steel roll shells having a face width of $14\frac{1}{2}$ in. when machined and ready for use weighed approximately 1776 lb. When worn down to the size shown in Fig. 2 their weight is 438 lb., the difference 1338 lb. or 75.3 per cent. of the original weight having been entirely expended in useful and effective work. The only machine work required consists in a partial removal of the flanges on the longer roll shell as the wear of the shell permits the flanges to approach the draw bolts of the centers.

This new roll design and manner of operating the roll was developed in connection with the dry crushing of very hard material used for abrasives such as quartz, garnet, etc., and is equally applicable to ores, and by the settling and removal of water from the mill feed it is possible to apply it to wet crushing as well as to dry. Perhaps the most interesting and obvious application is in connection with the treatment of complex ores.

The finished material department of Matthew Addy & Co., Real Estate Trust Building, Philadelphia, of which Lewis N. Lukens, recently president of the Longmead Iron Company, is manager, has been appointed sole agent for the Detroit Seamless Steel Tubes Company for New York City and the metropolitan district, taking effect March 1. This selling agency has represented the Detroit Seamless Steel Tubes Company in eastern Pennsylvania, New Jersey, Delaware and Maryland for some time. It is also sole agent for the Franklin Steel Company, Franklin, Pa.; the Cleveland Chain & Mfg. Company, Cleveland, Ohio, and the Wyoming Shovel Works, Wyoming, Pa.

The Upson Nut Company's blast furnace at Cleveland, Ohio, which has been out for relining, was blown in last week.

*From a paper presented at a meeting of the American Institute of Mining Engineers, held in New York City, February 20, 1912.

Novel Small Presses

An Interesting Group of Three Crimson Beauty Presses, Recently Built By the Perkins Machine Company

The Perkins Machine Company, Warren, Mass., has recently built three interesting and novel types of its Crimson Beauty machines. These are entirely automatic in their action and are designed for handling a great variety of work. The three presses are shown in Figs. 1, 2 and 3 and are respectively a riveting press, a machine for punching out the bottom of ferrules and a heading press. Details of the piston and the adjusting screw are given in Fig. 4.

The machine illustrated in Fig. 1 is entirely automatic and was built for the purpose of riveting two shells together. In doing this class of work it is necessary to have a sharp quick blow and at the same time it is essential that the dial works very slowly. In this press the balance wheel operates at a speed of 450 r.p.m. and the piston makes the same number of strokes, while the dial, which is connected by a belt running over cone pulleys attached to the balance wheel hub, has a speed of about 60 r.p.m. The eccentric for adjusting the dial is attached to the upper shaft, which is operated from the lower one by spur gears. The larger spur gear runs idle until the operator throws in the clutch. The movement of this clutch is controlled by a handle at the left of the machine and when the clutch is thrown in it engages the large gear and causes the lever arm to operate the dial plate. This lever can also be employed for stopping the machine, but as a general thing the machine runs continuously. At the farther side of the shaft a cam is attached which engages the latch. This cam is so timed that the dial makes the necessary movement before the plunger operates, thus making an automatic single trip of the plunger with an automatic time spacer of the dial.

The press illustrated in Fig. 2 is of the friction dial feed type, having a slide running parallel with the press shaft, which in turn is operated by a quick-acting cam on the end of the shaft. This imparts a quick movement to the carrier, which travels from the punch to the dial plate, taking one article at a time and bringing it to the punch to be pierced and ejecting it on return. The dial plate is in continual motion, which gives friction enough to keep the shells constantly up to the receiving arm. This machine was especially designed to punch out the bottom of ferrules and the operator sits in front of the machine and simply feeds the cups on the friction dial feed, which is controlled by the friction disk underneath. This machine operates at a speed of 250 r.p.m.

The machine shown in Fig. 3 is intended for heading eyelets on washers. This machine operates at a speed of 80 r.p.m., which is as fast as the articles can be fed upon the positive dial feed. The dial is 9 in. in diameter and has 12 notches.

The shafts of these presses are made of hammered

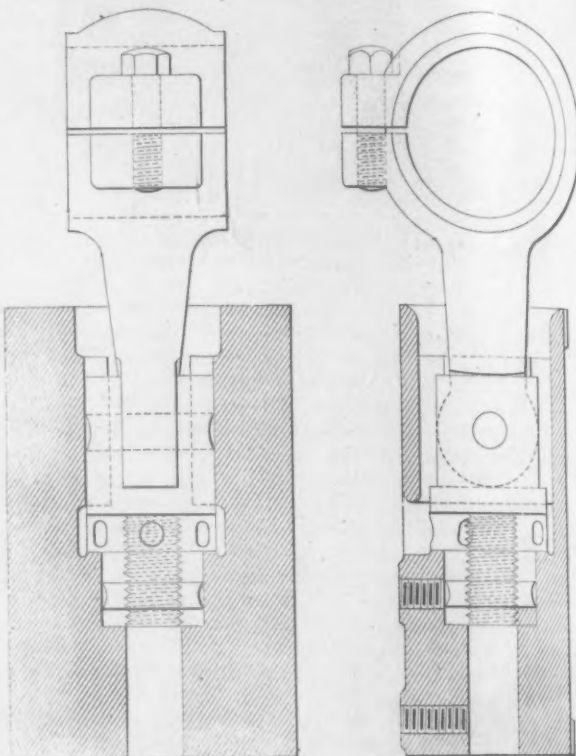


Fig. 4—Detail of the Piston and Adjusting Screw

crucible steel and when the stroke is less than 1 in. they are made eccentric, an arrangement which it is pointed out gives greater strength and durability. A stroke as long as 4 in. can be used with standard patterns, and for all strokes over 1 in. an ordinary type of crank shaft is employed. The clutch is of the sliding bar type and this style was adopted after considerable experimenting. The sliding dog strikes against square steel slugs inserted in the balance wheel. On account of the shape of the slugs they can be renewed by simply reversing them.

The piston is of the box type, which it is emphasized

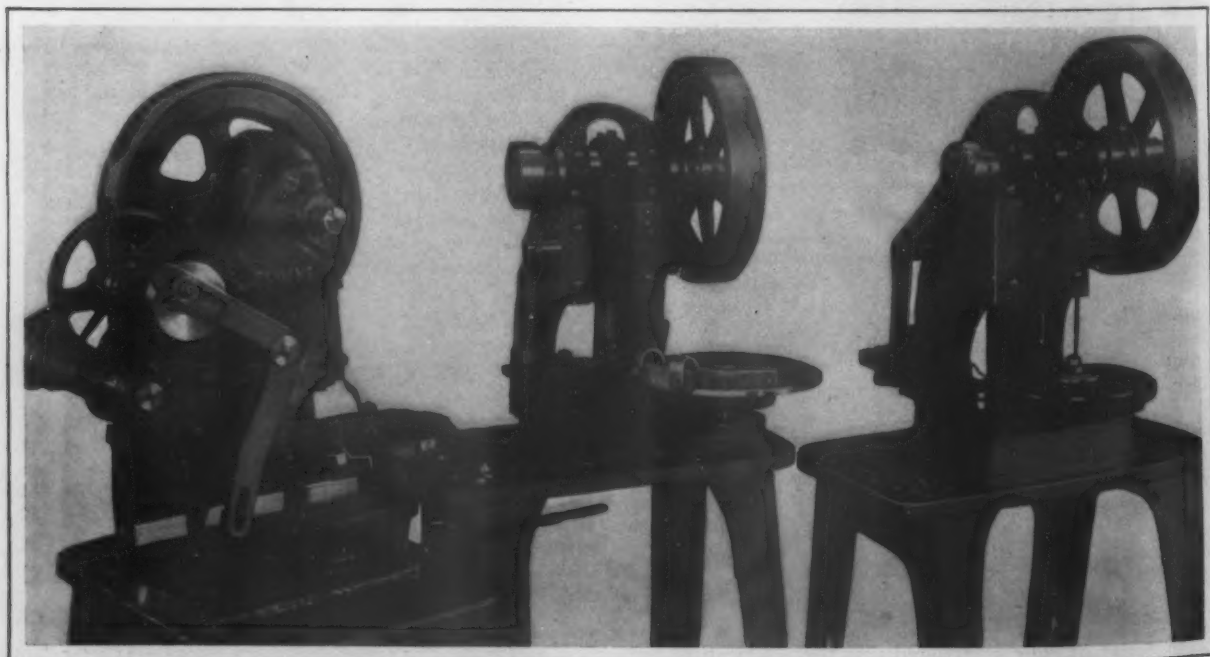


Fig. 1—Riveting Punch

Fig. 2—Ferrule Punch

Fig. 3—Heading Punch

Three Types of Crimson Beauty Punches Built by the Perkins Machine Company, Warren, Mass.

insures great strength. The toggle and the adjusting nut are made of steel and it will be noticed from Fig. 4 that the construction of the piston, adjusting screw, etc., is very compact. Micrometer adjustments can be secured from the nut which works on the screw. This part is supported in the piston and in making adjustments it is pointed out that it is impossible for the screw to bend, although it may be almost entirely withdrawn from the piston, as the nut is supported as shown. The gibways and the pistons are of the double angle type, a form of construction which makes the working parts durable and accurate.

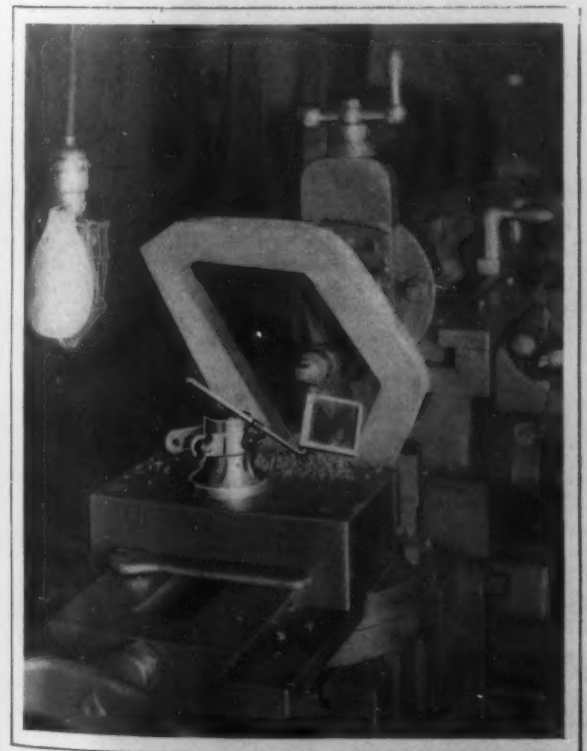
Two Universal Specialties

The Universal Stamping Company, 47 Poultney street, Buffalo, N. Y., has recently placed on the market two new specialties for shop use. One of these, which is a chip guard, is a development of the guard that was mentioned in the New Tools and Appliances Department of *The Iron Age*, May 4, 1911, and the other is a snap-on reflector lamp shade for use with incandescent lamps.

The earlier form of chip guard was designed for use on lathes. While the form of the guard has not been materially changed it is equipped with a stationary base block to adapt it for use on a shaper. To prevent the guard from slipping on account of the jar due to the shaper's motion the bottom of the block is covered with rubber. In connection with this guard either a plain or a magnifying glass can be slipped in the holder. The latter is an advantage when the guard is being used, since it brings out the lay-out lines of the work clearly, thus allowing the operator to shape closer to the line while at the same time his eyes are protected.

A report on the cause of shop accidents recently issued directs attention very forcibly to the necessity of a guard of this character. Flying chips and the flying out of articles being turned caused 127 out of a total of 670 accidents occurring in connection with lathe work. Although the majority of these accidents were not very serious and permanent injury did not result from them, at the same time an examination of these figures tends to show the necessity of securing the protection afforded by a guard of this character on some classes of work.

The reflector lamp shade which is also shown in the accompanying engraving is intended for use on drop cord lamps and fits any of the standard makes equipped either with or without guards. It can be snapped on instantly and can be adjusted to any position. The shade is suffi-

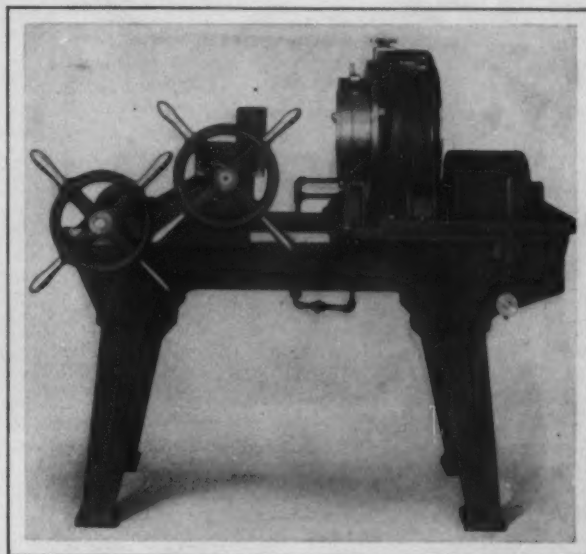


An Improved Chip Guard and a Slip-On Reflector Lamp Shade Made by the Universal Stamping Company, Buffalo, N. Y.

ciently large to protect the eyes from the glare of the light, while at the same time a stronger light is reflected on the work. The shade is made of bright tin plate, with the outside painted green or finished in either polished nickel plate or brass, and is adapted for all machine, bench and desk work where a drop light is used.

Motor-Driven Pipe Threader

A new type of pipe threading and nipple machine known as the Loew Victor lathe bed machine has been recently brought out by the Loew Mfg. Company, Cleveland, Ohio. The special advantages of the new machine are that it will not only cut off and thread pipe, but it will perform the



A New Type of the Victor Pipe Threading Machine Built by the Loew Mfg. Company, Cleveland, Ohio

same operations upon nipples without the use of a nipple chuck and in addition to possessing the advantages of the barrel type, it also employs the revolving die head which is generally found in the pedestal type.

The die head is self-locking and self-releasing and the cut-off attachment is out in the opening where it can be seen at a glance. It is emphasized that any size of nipple can be cut and threaded on this machine without the use of a chuck and can be handled as rapidly as by a single headed nipple machine. The machine has two changes of speed which are secured by the use of gears. Either belt or motor drive can be employed, and in either case the machine is self-contained. Where a belt drive is employed no countershaft is required, since the tight and loose pulleys are mounted upon the machine itself with a belt shifter.

The Strauss Bascule Bridge Company, Fort Dearborn Building, Chicago, announces that its design has been adopted by the Atlantic Coast Line Railroad for a 117 ft. 6-in. single leaf, single track span over the Altamaha River near Doctortown, Ga., and also by the Buffalo Creek Railroad for a 165-ft. single leaf, double track bridge over the Buffalo River at Buffalo, N. Y.

The Rockdale furnace, owned by J. J. Gray, Jr., Rockdale, Tenn., will resume operations this spring after five months of idleness. The special feature of this furnace is the use of phosphate rock in reducing the ore. It produces a pig iron having a high percentage of phosphorus, thus possessing properties that make it especially suitable for making the finer classes of castings.

The Inland Steel Company, Chicago, at a meeting of its stockholders March 5 authorized an increase in the capital stock from \$7,500,000 to \$10,000,000. The new stock to be sold is being offered to stockholders of record of March 5 at \$125. Subscriptions will close April 6. It is the intention of the company to build four more open-hearth furnaces and a plate mill.

New Hand Pump Factory

Details of Four New Buildings of the Plant of the Goulds Mfg. Company

A group of four new buildings has just been completed by the Goulds Mfg. Company, Seneca Falls, N. Y. These buildings are located at the southwest corner of the company's No. 2 plant and will be used exclusively by the hand pump department. They provide a material increase in the manufacturing facilities of this branch of the company's business and as an example of up-to-date factory construction possess several features of general interest. A plan of the plant with the new buildings in the lower left corner is given in Fig. 1, while the interior of one of these buildings showing the heating, lighting and fire protection arrangements is illustrated in Fig. 2.

The building nearest the railroad track will be used as a warehouse. It is constructed of reinforced concrete and measures 60 x 240 ft. Although at the present time it has only three stories, the foundation and superstructure are built to carry a future addition of one story. A reinforced concrete loading platform protected by a canopy and capable of accommodating six cars at one time runs along the side of the building adjacent to the railroad track.

The floors are of the beam and girder type and were designed to carry a load of 200 lb. per square foot. The loads on the stairs and the roof are 75 and 50 lb. respectively. In designing this building the stresses in the concrete and the steel reinforcement were not to exceed the following limits: extreme fiber stress in concrete in compression, 650 lb.; shearing stress in concrete, 75 lb.; tensile strength in steel, 16,000 lb.; concrete in direct compression,

U. S. steel sash and $\frac{1}{4}$ -in. wire glass windows are used throughout. There are two electric elevators in the towers shown on the rear of the building having a capacity of 6000 lb. each.

The two middle buildings which are identical in general design and are to be used as machine shops are constructed of steel and brick, and are one story high, the ground covered measuring 100 x 300 ft. As none of the parts entering into the construction of the hand pumps are heavy enough to warrant the use of cranes, the overhead steel framework was designed to provide a rigid and convenient means of attaching the main line and counter-shafts. The roofs of both of these buildings pitch toward the center, thus making all trusses alike and providing the maximum headroom above the transmission lines. The windows here are also of U. S. steel sash with $\frac{1}{4}$ -in. wire glass. They extend from the bottom of the roof trusses to within 4 ft. of the floor and run around the entire building without a break. The interior view reproduced in Fig. 2 shows the design of the roof trusses as well as the location and size of the windows.

The fourth and last building which is located adjacent to the foundry is intended for the storage of rough castings and is of mill type construction.

The Heating and Lighting Arrangements

The exhaust steam from the power plant is utilized for heating and one of the company's Challenge vacuum pumps is employed on the vacuum end of the system. The warehouse is heated by direct radiation and the returns from this building together with those from the two machine shops are handled by Warren Webster motor valves. The heating plant for the two machine shops is housed in a separate building between the two structures and consists

of a 200-in. Sturtevant steel plate fan with a capacity of 60,000 ft. of air per minute and a heater containing 12,000 lineal feet of 1-in. pipe. The heated air is distributed in the buildings through underground ducts, some of the outlets being shown in Fig. 2. The lighting system of the buildings consists of 250-watt General Electric tungsten lamps spaced 16 x 25 ft. The photograph from which Fig. 2 was reproduced was taken at night and serves to give some idea of the lighting arrangement.

In planning the addition it was laid out in such a way that all materials are so handled that the least possible time is consumed between operations and all the manufacturing space is utilized to the best advantage. From the foundry the castings pass through the small structure at the corner of the castings storage building. Here they are sorted and kept until requisitioned for by the machine shop, at which time they are delivered through a door in the northwest corner of the nearer machine shop. After passing through the various departments the castings

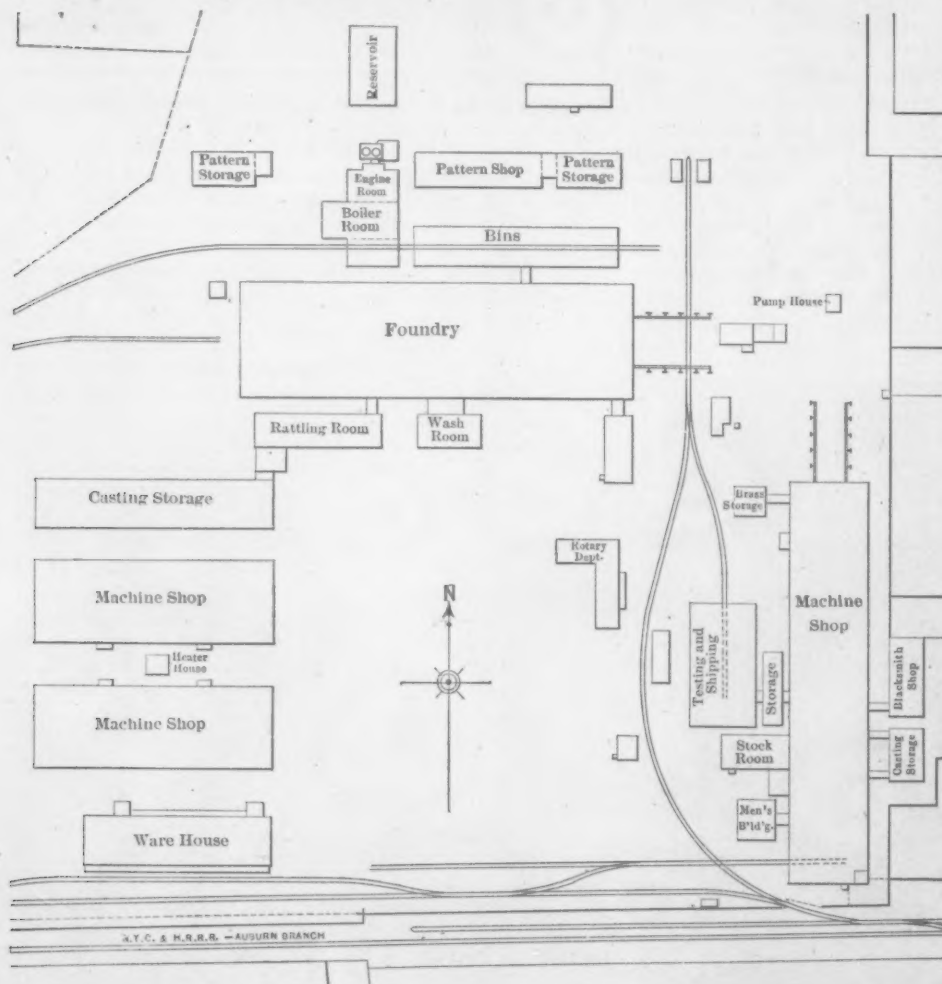


Fig. 1—Plan of the Plant Showing the Addition Recently Made by the Goulds Mfg. Company, Seneca Falls, N. Y.

700 lb., and shearing stress in steel, 10,000 lb. The ratio of the elasticity of the concrete and steel was taken as 1 to 12 and the amount of space occupied by the reinforcement in the columns is 1 per cent. of their entire area.

are machined and delivered to the northwest corner of the other machine shop. The storeroom for finished parts is located in the two center bays in the west or left end of this building and all parts pass through here into the assembly

department, which is located in the two side bays adjoining the storeroom. After the pumps have been assembled they are delivered to the painting department at the opposite end of the building and from there go to the warehouse, where they are kept awaiting shipment. The shipping department is located on the first floor of this building and as

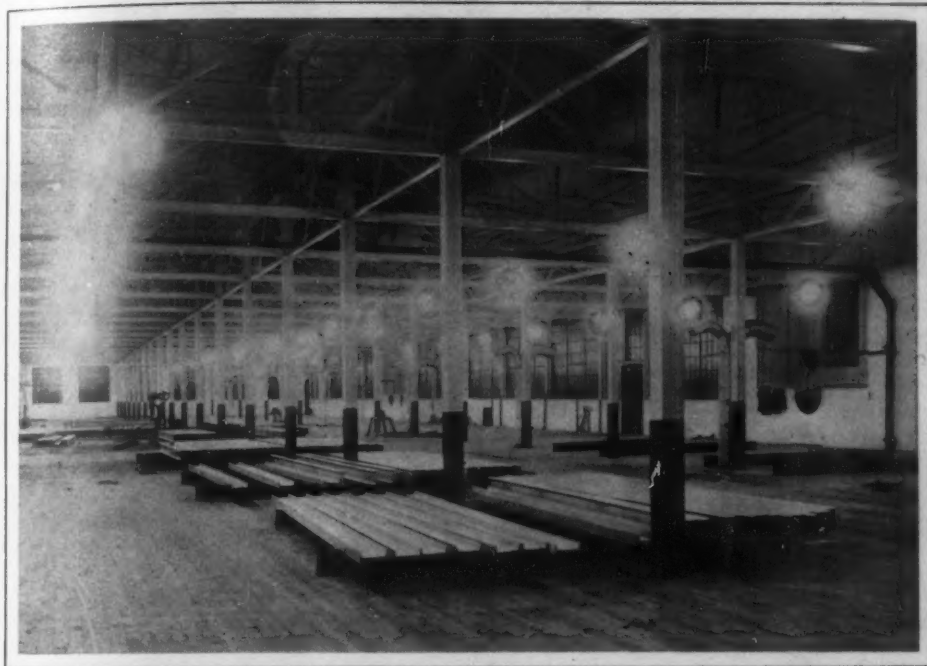


Fig. 2—Interior View of One of the Buildings, Showing the Heating, Lighting and Fire Protection Arrangements

it is at the same level as that of the floors in the cars on the siding the pumps after being boxed are taken into the cars easily.

The buildings were designed by the engineering department of the Goulds Mfg. Company under the direction of A. L. McHugh, works engineer, and H. H. Hall, supervising architect.

February Copper Production and Stocks

The Copper Producers' Association has issued its statement for February. It shows a decrease in stocks of 3,340,655 lb. The statement is as follows:

	Pounds.
Stock of marketable copper of all kinds on hand at all points in the United States, February 1.....	66,280,643
Production of marketable copper in the United States from all domestic and foreign sources in February....	116,035,809
Deliveries of marketable copper in February:	
For domestic consumption.....	56,228,368
For export	63,148,096
	<hr/> 119,376,464

Stock of marketable copper of all kinds on hand at all points in the United States, March 1.....	62,939,988
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As compared with January, production fell off 3,301,949 lb., which very closely corresponds with the shrinkage in stocks.

The Wellman-Seaver-Morgan Company, Cleveland, Ohio, has just received an order from the Ontario Power Company, Niagara Falls, Ontario, for a 14,000-hp. water wheel. The Power Company's plant now consists of 10 units and it will be gradually enlarged until 20 units are provided. In view of the fact that all water wheel equipment previously purchased by this company had been obtained from European manufacturers, considerable significance is given to the fact that this order, which is for a wheel of larger capacity than any previously installed by the company, has been given to an American concern.

The Farrar Iron & Steel Company, 12 Builders' Exchange Building, Buffalo, N. Y., has taken the sales agency for Buffalo and western New York for the Bayley-Springfield rolled steel sash, manufactured by the William Bayley Company, Springfield, Ohio.

Oglebay, Norton & Co.'s Iron Ores for 1912

Oglebay, Norton & Co., Cleveland, Ohio, have issued a booklet listing the ores from the Lake Superior district that they will sell during 1912, together with analyses. There are 28 ores in the list, which includes three new ores.

Two of these are the Kirtland and the Woodbridge coarse hematite from the Woodbridge mine in the Buhl district of the Mesaba range. The former is guaranteed to contain 52.70 per cent. iron, natural, and the latter 49.30 per cent. Another new ore is the Asteroid, a soft, red hematite from the Gogebic range, containing 52.10 per cent. iron, natural. The Porter and the Glyuna ores from the Yale mine again appear on the list. Oglebay, Norton & Co. have been agents for these two ores for years except last year, when they were in the hands of another interest. Mention is also made of Moose Mountain briquettes made by the Gröndal process from the Moose Mountain hematite ore mined in

Canada. These are 3 x 3 x 6 in. and have a guarantee of 61.38 per cent. iron, natural. Another ore that will be handled this year is the Susquehanna, which comes from a large open pit mine near Hibbing, Minn. In addition to the booklet the company is issuing a 21 x 27-in. colored map of the Cuyuna iron range, Crow Wing County, Minn. Copies of this map printed on heavy paper will be sent to blast furnace companies asking for it.

The Astra Oxy-Acetylene Process

A lecture with demonstrations on the industrial advantages of the Astra oxy-acetylene process was given by E. Raven Rosen-Baum, consulting engineer of Ashton, Laird & Co., on Friday afternoon, March 8, in the Doremus Lecture Theatre of the College of the City of New York. After a historical introduction dealing with the work which had been done along the line of the production of oxygen, the construction and use of acetylene torch were described with special reference to the employment of oxygen at two different pressures for heating and cutting. The carbonizing and the cutting flames were illustrated and discussed. The demonstration which followed included the cutting of a 12-in. steel I-beam, the welding of steel and cast iron, the building up of missing portions of a casting and the welding of aluminum. One of the special features of the demonstration was an exhibition of the working of quartz which was developed by Mr. Rosen-Baum in connection with a series of experiments which he has been conducting for a manufacturer of electrical machinery.

United States Steel Corporation shares are held in 37 foreign countries to the extent of \$144,782,300 par value. England alone owns \$97,000,000 of common and preferred. The next largest ownership is in Holland, aggregating \$27,000,000. The only other portions of the world exceeding \$1,000,000 are France, with \$9,400,000, and Canada, with \$6,200,000.

Blast furnace slag may be used for road building by adding a small amount of Portland cement to screened slag, according to Logan Waller Page, Director of the Office of Public Roads, Department of Agriculture, Washington, D. C.

Some Recent Large Presses

Various Interesting Machines Built by the E. W. Bliss Company

During the last few years it is probable that no class of power presses have developed as rapidly as the multiple-crank press. Until three or four years ago presses of more than two cranks or measuring over 4 or 5 ft. between the housings were seldom built. At the present

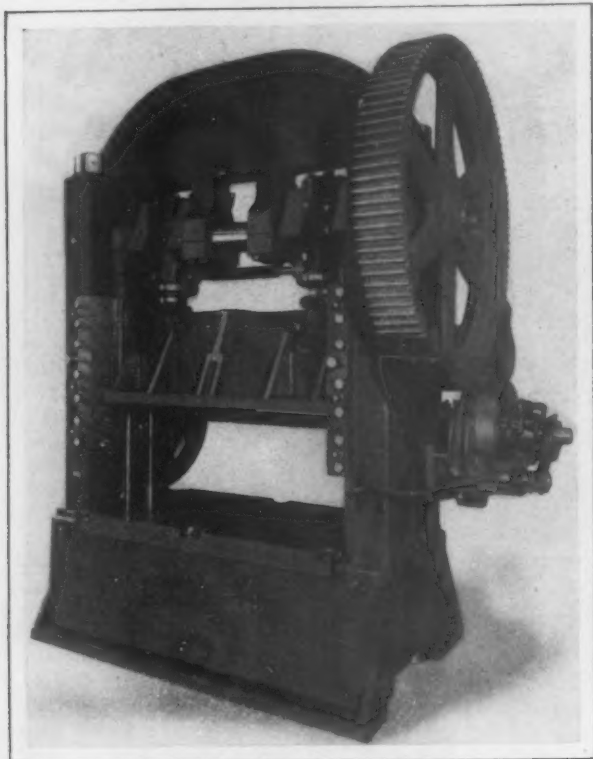


Fig. 1.—A Medium Size Double-Crank Press with a Gear Ratio of 27 to 1 Built by the E. W. Bliss Company, Brooklyn, N. Y.

time both the number of cranks and the distance between the housings have been increased until today presses having three or four cranks and a distance of from 10 to 16 ft. between the housings are quite common. Several types of these machines which have been built by the E. W. Bliss Company, 11 Adams street, Brooklyn, N. Y., are illustrated herewith. Fig. 1 is one of the presses which are commonly known as the straight sided tie rod type, while Fig. 2 shows a four-crank press, which, though of small capacity, is extremely wide, and Fig. 3 illustrates a somewhat new departure in large presses, this machine being a combination of the tie rod and gap frame type.

The first of these three machines is a medium size double-crank press with double gears having a ratio of 27 to 1. The distance between the housings is 6 ft., and the slide, which has a motion of 12 in., is arranged for a cross bar knockout. The machine is driven and controlled by a powerful combined friction clutch and brake fitted for hand control. The flywheel is 50 in. in diameter with a 7-in. face, and weighs 1300 lb. The total weight of the press is 50,000 lb. Other large presses of the straight sided tie rod type which this company has built include a triple-crank press, which is also double geared. This press is of smaller capacity and has a lower gear ratio, 24 to 1, but is much wider between the housings, the distance being 11 ft. On account of the great width the press is built with twin drives, that is, with a gear on each end of

the crankshaft, an arrangement which, it is emphasized, reduces the torsional strain on the crankshaft and equalizes the pressure on the journals and the gears. Like the press illustrated in Fig. 1, this machine is driven by a hand-controlled friction clutch. The movement of the slide is 4 in. and the flywheel is 40 in. in diameter and 6 in. wide across the face. The total weight of the machine is 59,000 lb. Another double-crank press possessing large capacity and less width was also recently completed by the company. The machine measures 8 ft. between the housings and has a 10-in. crankshaft and a 14-in. stroke. Like the triple-crank press mentioned above, it is also built with a twin drive and has a gear ratio of 36 to 1. The flywheel of this press weighs 1900 lb., its diameter being 56 in. and face width 7½ in. The weight of the complete machine is 110,000 lb.

The four-crank press illustrated in Fig. 2 is characterized by the possession of small capacity combined with an extremely wide frame. This machine is of the built-up frame type, with gap or overhanging housings, the distance between the outside housings being 14 ft. The crankshaft measures 4 in. in diameter and the stroke of the slide is 2 in. It also has a twin drive and the ratio of the gearing is 15 to 1. The dimensions of the flywheel are 36 in. in diameter and 5½ in. across the face, the weight of this part being 600 lb., while that of the complete machine is 25,000 lb.

In Fig. 3 a machine that is considered by the builder as a novelty in large press construction is illustrated. This press is a combination of the tie rod and gap frame type, which is a somewhat new departure in large press construction. Another special feature of the press is the arrangement of the gearing. It will be noticed from an examination of this engraving that the gearing is mounted on the housings above the crankshaft. This arrangement, it is emphasized, places the driving shaft and the intermediate gears above the operator's head and leaves the press entirely free on all sides. This location was decided upon by the builder on account of the conditions under which these presses are generally operated. In large machines of this type from two to four men are usually required to operate them, and one or more of them must of necessity stand in back of the machine to handle the work. It is emphasized that this is a very dangerous position when the gearing is arranged in the ordinary manner, as the rapidly revolving driving shaft and the intermediate gearing are in the operators' way.

The bed and crown of this tool are each cast separately. The side housings, which are of box cross section, are of the gap type, and the two large steel rods which hold the

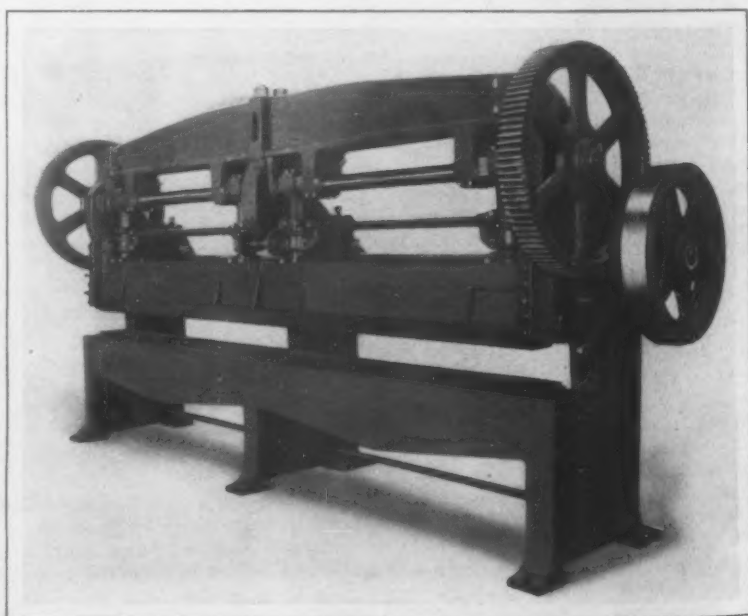


Fig. 2.—A Small Capacity Press with a Very Wide Frame

bed and the crown in place pass through the housings just back of the crankshaft and relieve them of all strain. The two smaller rods in front of the crankshaft do not

go below the gap, and are employed only to keep the crown from rolling. Two more steel rods pass through the bed and keep the housings from springing away from this part in the back, on account of the tension caused by the shrinking of the main rods which pass close to the

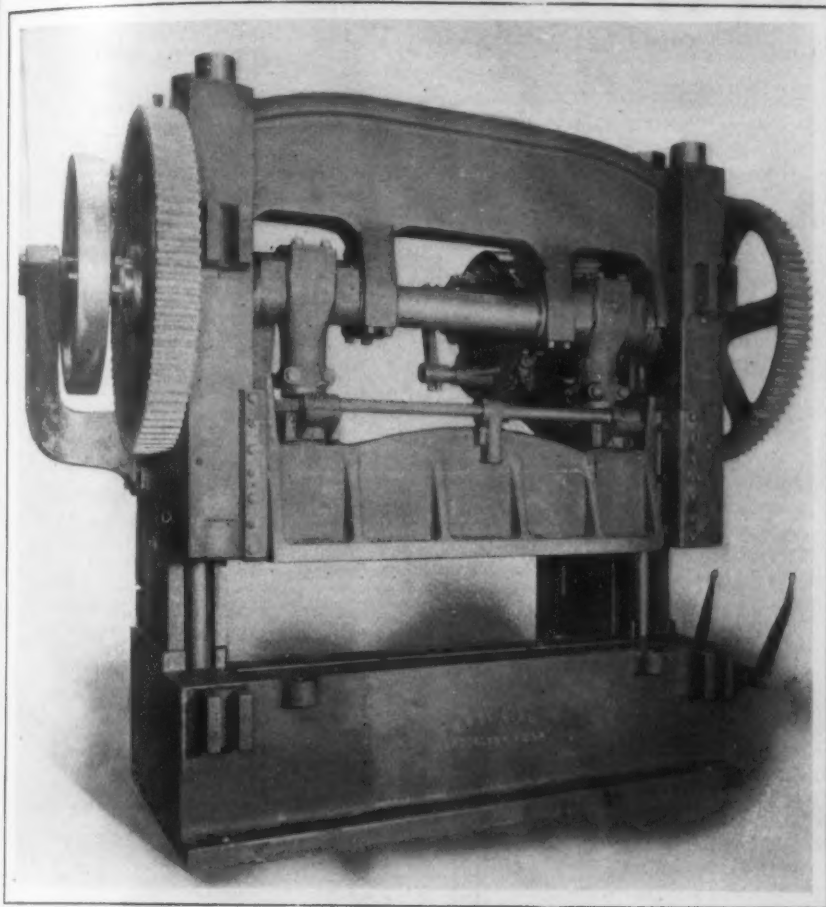


Fig. 3—A Press of the Combination Tie Rod and Gap Frame Type with the Gearing Mounted on the Housings Over the Crankshaft

front of the housings. This method of construction, it is pointed out, makes a machine of the gap type as strong as a straight sided press, as all of the strain of operation is taken by the steel rods instead of the cast-iron side housings with which the machines are generally built.

All of the machines mentioned are of the same general type and are used for blanking, forming and drawing operations on large sheets such as steel range bodies, automobile parts and work of a similar nature. They also have an opening through the housings so that long bars can be passed through the machine when necessary.

Pneumatic Tool Business

W. O. Duntley, president of the Chicago Pneumatic Tool Company, says that his company's domestic orders in January and February were better than for the corresponding months in 1910, which year was the best in its history. A Chicago daily paper quotes President Duntley as follows:

"I expect this will be our banner year. It has been so much ahead of 1910 that the outlook warrants the prediction. We have been very successful with the Little Giant commercial truck, which we manufacture, and the railroad motor car. We expect this year to build 1200 of each. Our main business, of course, is that of pneumatic tools, of which we manufacture 90 per cent. of all such tools in use. Our foreign business is also doing well and we are naturally very much pleased with the situation."

On March 1 the Carnegie Steel Company had all but four of its blast furnaces in the Pittsburgh district in operation, these being one Edgar Thomson, Edith, one Isabella and Neville Island. The only other furnaces of the company's 59 which were out of blast March 1 were one Mingo, Steubenville and Zanesville.

The Philadelphia Foundrymen's Association

Quite a representative attendance of local as well as out-of-town foundrymen attended the regular monthly meeting of the Philadelphia Foundrymen's Association, held at the Manufacturers' Club, on the evening of March 6, Thomas Devlin presiding. Resolutions were passed by the association protesting against the proposed reduction in duties on machinery in the Underwood tariff bill. Resolutions were also adopted favoring penny postage, while a resolution supporting a bill in Congress for the retirement of superannuated and disabled civil service employees was referred to a committee consisting of J. S. Hibbs, Elmer E. Brown and Horace L. Haldeman. Stacks & Johnson, Drexel Building, Philadelphia, general engineers and manufacturers of crushing machinery, were elected to membership in the association.

The paper before the association was on the "Holland Patent Combination Cupola," presented by Timothy Holland, president of the Holland-Domschke Foundry Company, Brooklyn, N. Y. Mr. Holland described his cupola by diagrams and blackboard sketches. It involves the combination of the ordinary vertical type cupola with a supplementary horizontal air or reverberatory furnace. Charging is done in the usual manner, while the waste heat from the reverberatory furnace is used to heat the blast entering the cupola proper, increasing its melting ratio, while the refinement of the molten iron in the air furnace section of the apparatus is used to materially improve the metal before pouring into castings.

Industrial Exposition at Newark, N. J.

The Newark Industrial Exposition, under the auspices of the Board of Trade, will be held in the First Regiment Armory, Newark, N. J., May 13 to 25. The building is large and admirably adapted to exhibition purposes. It is claimed that 100,000 different articles are manufactured in the 3000 shops of the Newark district. Not only will the products of Newark's factories be shown, but also the processes of manufacture. The committees in charge of the project number 300 representative citizens, and the chairman is Curtis R. Burnett, who is president of the Board of Trade. William G. Rose, 800 Broad street, is manager. The city now ranks fourteenth in population in the United States and eleventh in manufactures, and while it is enjoying a period of greater prosperity than ever before in its history the citizens propose through this project not only to teach Newark to know itself, but to cause the world to become better acquainted with the city and its industrial achievements.

The patternmakers working in the jobbing shops at Portland, Ore., made a demand February 28 for a minimum wage scale of 56 cents an hour and an eight-hour day. Previously they had asked for a minimum of \$5 for a day of eight hours. The shops in Portland have not been busy of late and the strike thus far has not caused serious disturbance. At Los Angeles the strike has been called off in the manufacturing plants, but not in the railroad shops. Conditions in the former will remain as they have been—nine hours a day and the open shop. At last reports no agreement had been reached in San Francisco as to the hours to be worked.

Small-Sized Fuel in the Gas Producer

Results with the Kerpely High Pressure Type, Showing a Considerable Advance in the Use of Fuel of Low Value

A description of a Kerpely producer, especially designed to gasify small-sized fuel, together with a table showing some of the results obtained, were given in an article in *Stahl und Eisen* for December 28, 1911. Many attempts have been made in recent years to develop a producer capable of gasifying successfully finely divided waste fuels; but usually tests of the producers advertised have quickly shown that the amounts of fuel gasified per hour and per square foot of shaft surface were unsatisfactory and that the ash contained considerable ungasified fuel. The chief problems involved are: First, the great resistance which the small fuel offers to the passage of the blast; second, the production of ash sufficiently free from combustible material.

Many tests have been carried out with an ordinary Kerpely gas producer plant, to determine the lowest limit in size of fuels which will allow successful operation. Varying results were obtained. More fine material can be used in the case of caking coals than with other fuels; and, generally speaking, with a caking coal varying in size from fine dust to pieces 0.59 in. diameter satisfactory results can be obtained with about 40 per cent. to 50 per cent. fines under 0.197 in. diameter. This because the caking changes the size of the pieces and to some extent makes a coarse material.

With fuels such as coke breeze, brown coals, semi-anthracites and anthracite with much dust, there is difficulty with 20 per cent. of material under 0.197 in. diameter. The condition of the fuel plays an important part, for if the last-named fuels have much moisture the driving off of this moisture in the upper part of the producer often causes them to decrepitate and consequently increases the percentage of dust. When this happens it is always more difficult for gasification to take place, over the whole cross-section of the producer. The amount of fuel gasified per unit of time and the quality of the gas sink very quickly

with increasing dust contents, and the fuel actually used is low in amount because of the large percentage found in the ash.

For a long time tests have been carried out at the plant of the Oesterreichisch-Alpinen Montanengesellschaft at Donawitz with a small gas producer of 43.3 in. diameter. The final results were so favorable that a larger producer,

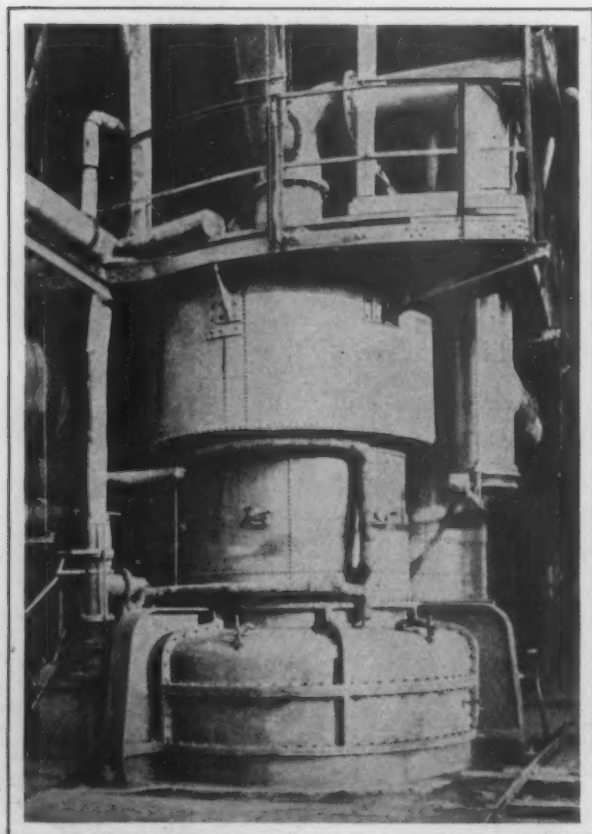


Fig. 1—The Kerpely High Pressure Gas Producer

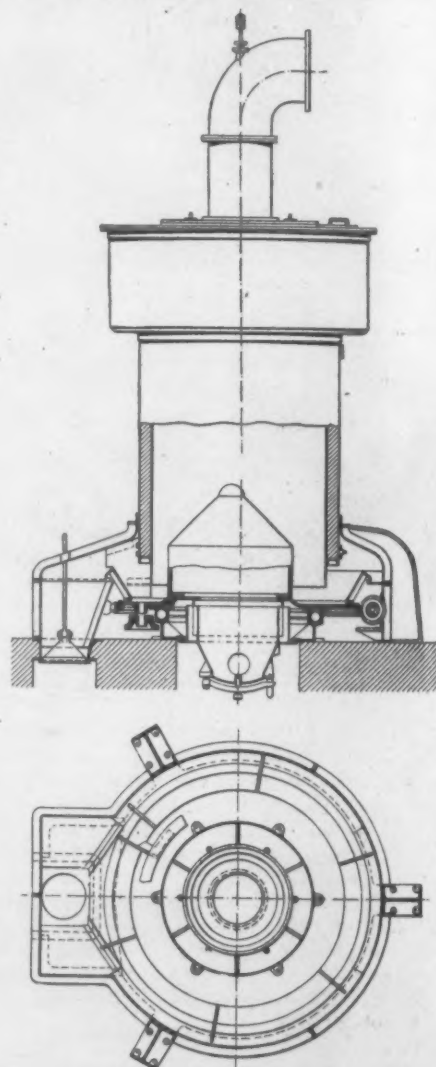


Fig. 2—Section and Plan of the Kerpely High Pressure Gas Producer

78.7 in. in diameter, has been built based on the same principle. The fuel used is breeze from blast furnace coke, and the producer has been in continuous operation since it was built. It is shown in Figs. 1 and 2 and is called a Kerpely from the name of the inventor. It is a revolving grate producer with the lower part completely closed. The blast passes through the many fine openings of the specially constructed grate at a pressure varying from 15.75 in. to 27.56 in. of water, depending on the size of the fuel. It is distributed in many fine streams over the whole section of the producer and because of the force with which it comes in contact with the fine particles of fuel brings about complete combustion.

The ash is collected by means of a very simple automatic arrangement in a pit arranged with a bell. This is emptied two or three times a day, depending on the kind of fuel used. The lower part of the shaft of the producer is formed of a water-cooled mantle that passes into an upper and somewhat wider part lined with fire-brick, which car-

ries a central combined gas main and charging arrangement.

Due to the great interest taken in this producer extensive tests were carried out with other fine fuels, the results of which are given in the accompanying table. The analyses were made on large samples weighing about 100 lb. The gas analyses were made on samples taken hourly in the daytime and once before and once after midnight. The values given are average results. The pressure of the gas taken at one of the poker holes amounted to 0.59 in. to 0.78 in. of water and so was rather under than over the normal. Because of this the amount of dust in the gas was also very low.

The table also shows in the last column the results obtained with a several day test of brown coal briquettes from the Rhine provinces. As is well known the hygroscopic property of the ash from these briquettes, containing over 50 per cent. lime, gives trouble in ordinary plants. The water and the ash form a gummy mass that easily stops up the grate openings if the fire zone is too high. Because of the special grate construction of the new pro-

The Railway Steel Spring Company's Year

The annual statement of the Railway Steel Spring Company for the year ended December 31, 1911, enables the following comparison to be made between the income account of that year and the preceding year:

	1911.	1910.
Gross earnings	\$6,160,496	\$10,035,435
Less manufacturing, operating, maintenance, repairs, administrative expenses, etc.	4,793,481	7,734,535
Balance	\$1,367,015	\$2,300,900
Depreciation	150,000	350,000
Net earnings	\$1,217,015	\$1,950,900
Interest	232,228	195,823
Dividends on preferred stock	\$984,787	\$1,755,077
Surplus for the year	\$39,787	\$810,077
Previous surplus	3,799,778	2,989,701
Total surplus, December 31	\$3,839,565	\$3,799,778

Table of Results Obtained with Small Sized Fuels in a Kerpely Gas Producer.

Kind of fuel.	Breeze from blast furnace coke.	Breeze from gas works (strongly clinkering).	Coke breeze from Orlan.	Coal dust from Orlan (caking).	Coal dust from the dump of the Oheim mine.	Brown coal briquettes. Brand "Union" pieces weighing about 3.54 oz.
Size—Inches—Above 0.472 dia.....	8.5%	2.2	6.2	6.2	4.4	
" " 0.315 to 0.472 dia.....	10.6	20.4	6.3	11.3	10.1	
" " 0.197 to 0.315 dia.....	24.4	21.6	12.8	20.0	23.9	
" " 0.118 to 0.197 dia.....	19.5	17.2	16.2	19.0	20.1	
" " 0.039 to 0.118 dia.....	25.6	26.2	33.8	25.5	30.4	
" " 0.019 to 0.039 dia.....	7.6	7.6	12.1	8.1	7.0	
" " below 0.019 dia.....	3.8	4.8	12.6	9.9	4.1	
Analysis of fuel.						
Carbon, per cent.....	69.42	68.60	71.30	66.10	60.97	56.70
Moisture, per cent.....	5.44	2.40	10.10	3.60	9.25	10.80
Ash, per cent.....	18.25	24.40	13.00	14.80	14.60	5.22
Heating value of fuel in B. t. u.....	10144.8	10548	10854	10260	10170	8802
Amount gasified in 24 hr. in lb.....	19180	20062	17637	25573	21385	46297
Average analysis of the gas, per cent. CO ₂	5.57	7.9	7.5	4.71	5.18	4.40
Average analysis of the gas, per cent. CO	26.90	23.4	23.45	26.32	26.66	29.80
Average analysis of the gas, per cent. CH ₄	11.91	12.5	0.60	2.80	1.90	2.70
Average analysis of the gas, per cent. H ₂	125	116	121	151	152.4	159
Lower heating value of the gas, B. t. u. per cu. ft.....	1.8 per cent	2.2 per cent	4.2 per cent	2.25 per cent	2.60 per cent	0.2 per cent
Amount of carbon of the fuel lost in ash.....	0.655	1.18	1.57	not determined	4.63	not determined
Tar and dust in the gas. Grains per cu. ft.....	13.78	15.75	19.68	17.72	22.83	9.84
Blast pressure, inches of water.....	to 17.72	to 19.68	to 27.56	to 19.68	to 26.77	to 13.78

ducer and the fact that no water seal is used these difficulties did not appear and the test gave splendid results in every respect. Before the test the producer was filled with burnt lime to somewhat above the peak of the grate in order to prevent the action of foreign ash on that of the briquettes.

These results certainly lead to the conclusion that this type of producer has made possible an important step forward in the use of lower value fuels. G. B. W.

The use of electric power in the iron mines and ore concentrating mills of Witherbee, Sherman & Co., Port Henry, N. Y., has been described at length in the General Electric Review, and a reprint of the article has now been published in the form of a generously illustrated 16-page pamphlet, obtainable by applying to the advertising department of the General Electric Company, Schenectady, N. Y. The article covers power generation and transmission to the mines and mills and shows how electricity is employed for hauling in the mines and for driving ore crushing machinery, air compressors, hoists, tipples, etc.

A number of prominent English men and women are seeking to recover the money they invested in the defunct National Steel & Wire Company, and have brought an equity suit in the United States District Court at New York against Henry E. Huntington, the Knickerbocker Trust Company of New York and others. The plaintiffs allege that the company was insolvent and that though for a short time dividends were paid on the preferred stock, it was not out of any funds lawfully available, but simply for promotion purposes.

A 12-page leaflet by Frank C. Roberts & Co., Philadelphia, with the title, "Gayley Dry Blast," gives illustrations and data concerning several of the Gayley plants now in operation, which were built under the design and supervision of the Philadelphia firm.

The balance sheet as of December 31 is as follows:

Assets.	
Plants, properties, etc.	\$33,745,839.23
Inventories of materials, supplies and products, finished and in process	1,621,952.81
Stock, bonds and investments.....	399,490.67
Accounts receivable	1,148,047.08
Other items	26,125.00
Cash	1,484,396.49
Total	\$38,427,851.28
Liabilities.	
Capital stock, preferred.....	\$13,500,000.00
Capital stock, common.....	13,500,000.00
Latrobe plant, 5 per cent bonds.....	3,672,000.00
Inter-Ocean plant 5 per cent bonds.....	3,500,000.00
Accounts payable	147,917.25
Reserved for preferred stock dividend, interest on bonds, taxes, etc.....	268,368.52
Surplus	3,839,565.51
Total	\$38,427,851.28

From the accompanying remarks by President F. F. Fitzpatrick the following extracts are taken:

The decrease in the net earnings as compared with the preceding year was due to the marked curtailment of buying by the railroads, and the company suffered in general with the other companies that rely upon the purchasing power of the railroad systems for the larger portion of their business. When business, especially the affairs of railroads, becomes settled, and the railroads enter the equipment market for their customary requirements, the stockholders may be assured that their company is fully prepared to take advantage of the change in the conditions.

On October 1, 1911, the manufacturing plant of the Inter-Ocean Steel Company was acquired. This plant covers about 80 acres of land at Chicago Heights, Ill., upon which is located a thoroughly modern factory, built and completed during 1909-1910, especially adapted to the manufacture of steel tires and allied products, and is fully equipped with the most improved machinery suitable for such purpose. The company issued bonds to the amount of \$3,500,000 to acquire this property. Commencing April 15, 1914, \$125,000 will be paid annually into a sinking fund to be used in the gradual retirement of the bonds. The management believes that in acquiring this property,

located as it is in the heart of the Western railroad equipment market, decided strength has been added to the company, and it is estimated that it will earn considerably more than the amount necessary for the interest on the bonds and the sinking fund.

The sinking fund provisions of the mortgage securing the Latrobe plant bonds were complied with during the year. Since the issue of the bonds, the total amount retired by the operation of this sinking fund is \$828,000, and the annual fixed charge has been reduced from \$225,000 to \$183,600.

The company is in excellent physical condition, all of its plants being maintained at a high degree of efficiency. Financially, it has a larger amount of liquid assets than in its past history, and it is thoroughly prepared in all of its departments to meet with any demand for its output.

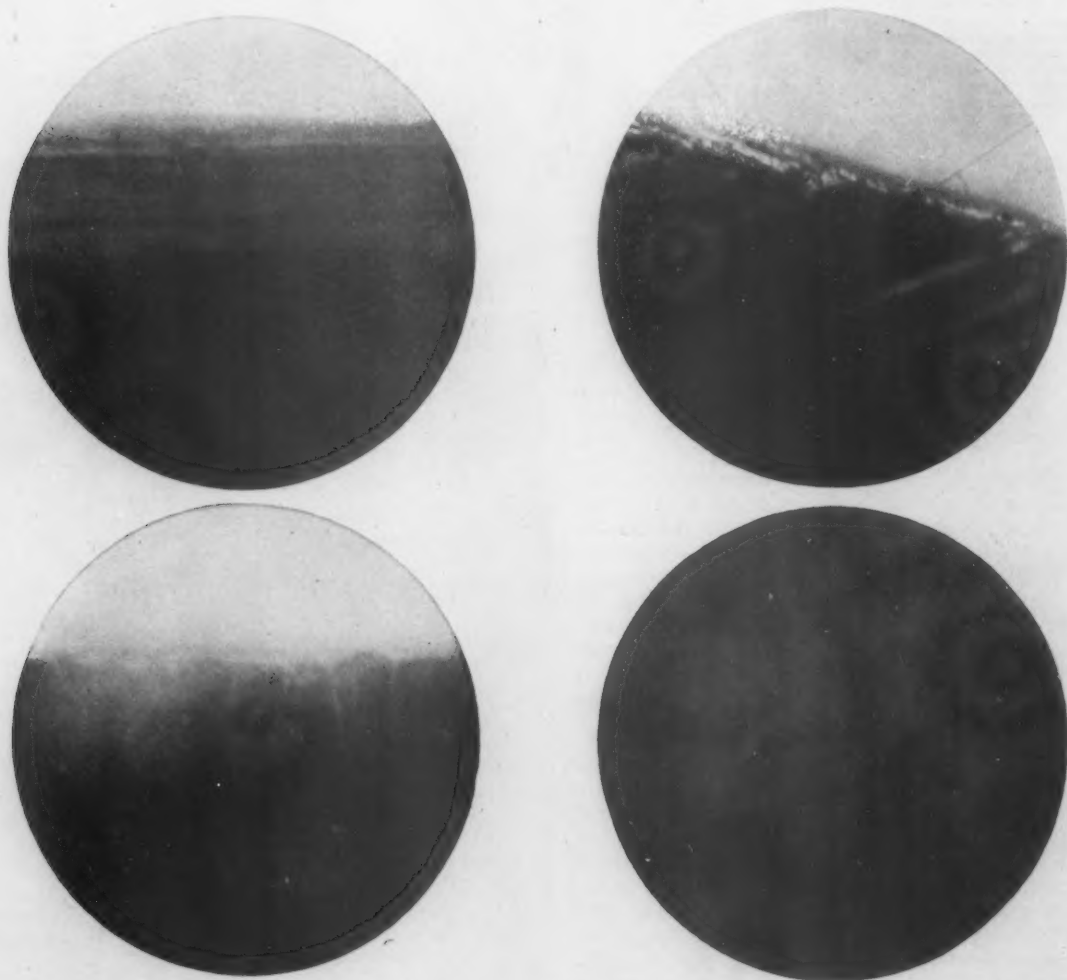
Lohmannizing Sheet Metal

Process Employed by the Brier Hill Steel Company to Amalgamate a Protective Alloy with Iron and Steel Sheets

A process for giving a protective coating to iron and steel sheets has been the subject of experiments on the part of the engineering staff of the Brier Hill Steel Company, Youngstown, Ohio, and also for that company by the mechanical department of one of the main railroad systems of the country, and the results of the observations are now available. The process is known as the Lohmannizing process and some idea of the special value ascribed to it may be gained from the accompanying reproduction of a pho-

tograph of a cross-section of a sheet so treated magnified 65 times. It is the claim of the inventor that the protecting alloy extends below the surface of the metal, filling every pore and cavity, and the cross-sectional microphotograph is presented to show this penetration which is to be differentiated from a coating which shows a layer of metal rather than an amalgamation.

The Lohmann process appears to require merely what is known as the Lohmann bath, containing an amalgamating salt, and later an immersion in a molten alloy. Briefly described, the metal to be treated is pickled in a bath of sulphuric acid to remove rust and scale and it is then dipped in the bath, where the pores and cavities of the metal are further cleaned. A metallic salt is deposited upon the entire surface, penetrating the cavities, as explained, and then the treated metal is dried and immersed in a molten alloy, where an amalgam is formed. The metal is gradually raised in temperature by the molten alloy, which has a temperature of 950 to 1000 deg. F. When the specimen treated reaches a temperature of 500 deg. the amalgamated element volatilizes and on being released comes to and passes rapidly from the surface of the alloy. The point is here made that in its passage this evaporating amalgamated salt frees the surface of the metal, including pores and cavities, from all oxidizing agents. As the salt in evaporating empties itself from each microscopic pore the protective alloy takes its place and the base surface being cleaned it adheres. The oxygen present in the pores and on the surface, it is added, having a greater affinity for the amalgamating element than for either the base metal or the alloy, passes to the atmosphere, leaving no form of oxygen lying between the treated metal and the protective coating.



Microphotographs to Exhibit the Features of the Lohmannizing Process Applied to Iron and Steel Sheets

The upper left photograph is one of edge of galvanized sheet, showing the somewhat sharp line of demarcation between zinc layer and metal of sheet. Reduced from photograph magnifying 65 times so that it now appears about 45 times magnified.

The lower left photograph shows the effect of the Lohmann process. The deep penetration of the protective alloy is indicated by what may be called long, slender tentacles, differentiating the result from that showing a layer rather than an amalgamation. Reduced to about 45 diameters from a photograph magnified 65 times.

The upper right photograph shows the edge of a lead Lohmannized corrugated iron sheet, magnified 65 times with same subsequent reduction as before. The permeation of the sheet by the alloy is indicated.

The lower right photograph shows the surface of Lohmannized corrugated metal, at about 21 magnifications, the original photograph being magnified 30 times, and is reproduced to show absence of pinholes.

An important feature of the process is the use of an alloy composed of zinc, lead and tin, varied to suit the requirements of service. The accompanying reproduction of a micrograph of a hot galvanized sheet, also magnified 65 times, is offered to indicate that the protective coating is merely a covering such as a coat of paint and that no gradual shading from original alloy to the base metal appears as in the section of the Lohmannized sheet. It is claimed that if the thin outer coating of alloy of the Lohmannized sheet is ruptured there still exists over the sheet a protective agent owing to the permeation of the treated metal by the protecting alloy, which cannot be fractured in ordinary use without breaking the sheet itself. Finally, as contrasted with the fear that some of the pickling acid in the ordinary process may remain between the zinc and the base metal in the finished sheet, it is held that the amalgamating element in the Lohmann process carries away acid and gaseous adulteration, leaving nothing to hinder the union of alloy and base metal. It is emphasized that the Lohmann coating is non-porous.

The Lackawanna Steel Company

Report for the Year Ended December 31, 1911

The full report of the Lackawanna Steel Company for the year ended December 31 has now been received, and a more detailed statement regarding the results of the year can be presented than that which appeared in *The Iron Age* of February 29. The profit and loss account is as follows:

Gross sales and earnings.....	\$21,040,386.67
Less—manufacturing and producing costs and operating expenses	17,394,306.91
Total net income from manufacturing and operating	\$3,646,079.76
Dividends on investments in companies not controlled, net income from property rented, etc.....	526,637.31
Commercial discount and interest.....	58,276.29
Total income	\$4,230,993.36
Deduct—administrative selling and general expenses, including taxes	739,514.91
Net earnings for the year 1911.....	\$3,491,478.45

The income account is shown in the following table:

Total net earnings of all properties, after deducting all expenses, including ordinary repairs and maintenance, but not renewal expenditures and other appropriations for the current year, which are deducted below	\$3,491,478.45
Deduct—interest on bonds and debentures:	
Lackawanna Steel Company.....	\$1,750,000.00
Subsidiary companies	354,900.00
	\$2,104,900.00
Rentals and royalties.....	101,536.00
	2,206,436.00
Balance	\$1,285,042.45
Less—appropriations:	
For sinking funds on bonds and exhaustion of minerals.....	\$260,056.20
For depreciation and accruing renewals	942,183.18
	1,202,239.38
Profit for the year.....	\$82,803.07
Surplus at January 1, 1911.....	3,747,704.14
Net surplus at December 31, 1911.....	\$3,830,507.21

The balance sheet as of December 31 is presented below:

Assets.	
Cost of property, real estate, buildings, plant, machinery, etc.:	
As at December 31, 1910.....	\$64,156,762.69
Additions in 1911.....	1,030,369.70
	\$65,187,132.39
Investments in ore companies, etc.....	6,403,666.56
Cash in hands of trustees, account of bond sinking fund	438,000.00
Stock of Lackawanna Steel Company in hands of trustees at par (deducted contra).....	250,000.00
Current assets:	
Inventories	9,970,146.46
Miscellaneous accounts receivable.....	312,460.74
Customers' accounts (less reserve).....	3,448,944.33
Notes receivable	337,782.51
Cash in banks and on hand.....	4,623,224.74
Deferred charges	172,088.60
Total	\$90,893,446.33
Liabilities.	
Stock issued—349,780 shares.....	\$34,978.00
Less—amount of stock in hands of trustees	250,000.00
	\$34,728,000.00
Capital stock of the Lackawanna Iron & Steel Company not held by Lackawanna Steel Company, 220 shares	22,000.00

Bonded debt:

Lackawanna Steel Company:	
First mortgage bonds due 1923.....	15,000,000.00
First consolidated mortgage bonds due 1930.....	10,000,000.00
Subsidiary companies' bonds	7,058,000.00
Five year convertible debentures due 1915.....	10,000,000.00
Current accounts payable and pay-rolls.....	1,486,143.84
Bills payable	424,531.66
Taxes and interest accrued	674,100.15
Depreciation and replacement funds.....	4,751,786.34
Mines extinguishment and bond sinking funds.....	2,660,864.99
Contingent and miscellaneous operating funds.....	257,512.14
Surplus	3,830,507.21
Total	\$90,893,446.33

President E. A. S. Clarke says in an accompanying statement:

In the report a year ago, attention was called to the decline in the prices of steel which began in 1910 and continued throughout the year, and also to the diminishing sales in the last half, and particularly in the last quarter of that year. The demand for the company's products continued small during the first half of 1911, and though somewhat increased in the latter part of the year, was, as a total, unsatisfactory, as evidenced by the shipments for the year. In the month of May, 1911, there was a serious break in prices, so that the business done in the last half of the year was at the lowest figures, conditions considered, that have ever obtained in this country, being in most instances lower than those of 1909. The average price of \$27.67 per gross ton, received by the company for its products in 1911, is \$1.25 per ton less than the corresponding price for 1910. This price, together with the reduced shipments and the greater costs of operation in 1911 over 1909 and 1910, accounts for the reduction in earnings against those years.

The company received in 1911, from mines which it owns, or is interested in, and from other sources 987,314 gross tons of iron ore, and produced a total of 844,829 gross tons of coke and 735,980 gross tons of pig iron. It also produced 345,038 gross tons of Bessemer ingots and 453,214 gross tons of open-hearth ingots, a total of 798,252 gross tons of steel ingots of all kinds. Shipments of products were as follows, all in gross tons, the figures for the years 1908, 1909 and 1910 being given for comparison:

	1911	1910	1909	1908
Standard rails	225,699	363,577	278,885	190,761
Light rails	18,521	26,288	33,787	20,251
Angle bars, fittings, etc.....	35,424	60,071	43,901	16,711
Structural shapes	116,581	146,641	138,021	72,816
Plates	52,756	87,469	60,953	33,832
Merchant steel products	77,010	67,150	41,607	17,921
Sheet bars, slabs, billets and blooms	92,967	159,761	201,453	104,108
Pig iron and miscellaneous....	141,403	171,558	115,044	20,438
Total	760,363	1,082,515	913,653	476,850

The new merchant bar mill mentioned in the report of a year ago was completed and put in operation in the month of September, 1911, and, as anticipated, contributes much to the greater diversification of the company's products, following the established policy of the directors.

In order to meet the increasing demand for open-hearth steel, the company's producing capacity will be increased during the year 1912 about 35 per cent. by the construction of two 60-ton furnaces and a hot metal mixer for the open-hearth department, as authorized by the directors in the latter part of 1911. Further additions to the open-hearth ingot capacity will have to be made in the near future.

Orders on hand have increased since January 1, and are now greater than at any time since July, 1910, and it is hoped that, with the removal of existing political uncertainties, better prices will obtain and general business conditions be more satisfactory.

The Blood Bros. Machine Company, Kalamazoo, Mich., manufacturer of universal joints, is running its factory with full forces both night and day. Although the company has added new buildings and equipment during the past four months, nearly doubling its capacity, it still finds difficulty in keeping up with orders. The entire factory at the present time is devoted to the manufacture of universal joints.

The Bethlehem Steel Company blew in its furnace E February 13. On March 1 all of the company's six furnaces were in blast.

Wrought Iron, Steel and Corrosion

A Study in Differences of Chemical and Physical Properties and Their Relation to Variations in Service—"Iron" from the Open Hearth Furnace

BY WILLIAM R. FLEMING

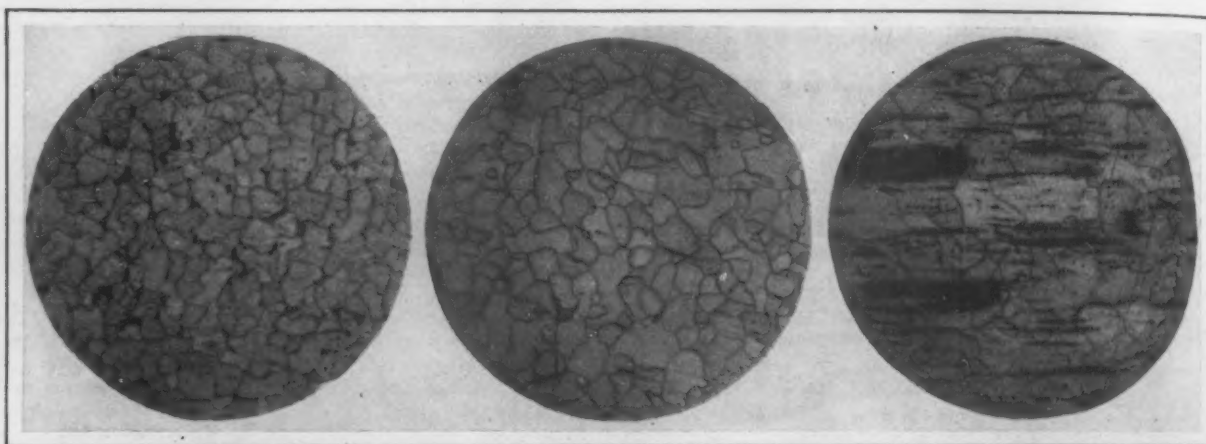
Wrought iron¹ in service resists corrosion better than steel.² This truth is demonstrated by an overwhelming mass of practical evidence. But why is wrought iron superior to steel? Experience does not answer this question. This article aims to connect the most characteristic properties of wrought iron and steel with the service rendered by each.

Physically, wrought iron is a mechanical mixture of metal and slag. Steel is entirely metallic in structure.

The Claim for Wrought Iron

The exponents of wrought iron base all claims for it on its physical structure, obviously because it cannot be imitated by the steel maker. This claim has been set forth in the following statement of a manufacturer:

After the spongy mass is removed from the furnace and compressed by squeezing, hammering and rolling, much of this fluid cinder is expelled; but a thin coating of each crystal remains, and



*Fig. 1—Steel; carbon 0.04

Fig. 2—"Open Hearth Iron"; carbon 0.01

Fig. 3—Wrought Iron; carbon 0.01

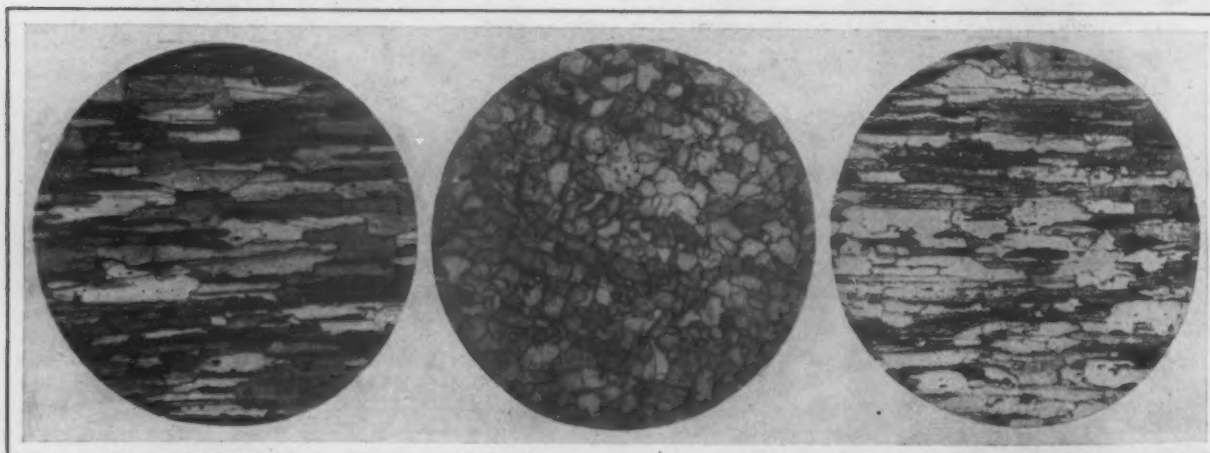


Fig. 4—Rolled at 750 deg. C. Carbon, 0.01

Fig. 5—Heated to 920 deg. C. Cooled with Furnace

Fig. 6—Heated to 870 deg. C. Held 24 Hours and Cooled with Furnace

Wrought iron is heterogeneous; steel homogeneous. Chemically, wrought iron is exceedingly uniform—free from segregation. Steel is by no means uniform—is irregular, chemically. Wrought iron is homogeneous; steel heterogeneous. The chief distinguishing characteristics of the two metals may be contrasted briefly as follows:

	Physical structure.	Chemical composition.
Wrought iron	Heterogeneous	Homogeneous
Steel	Homogeneous	Heterogeneous

Physically and chemically one is the antithesis of the other. We should, therefore, expect them to be different in their abilities to resist corrosion. Undoubtedly the superiority of wrought iron is due either to its different physical structure or to its different chemical character.

¹By wrought iron is meant only the straight pig product of the puddling furnace.

²By steel is meant the common low carbon varieties of sheet steel (mild) made in the Bessemer converter or open hearth furnace.

*All of the 10 photomicrographs represent about 105 diameters magnification, being slightly reduced from 120 diameter views

when the mass is rolled out these crystals become elongated, giving wrought iron a stringy or so-called "fibrous" structure; that is, the strings of iron are coated with minute capsules of cinder. This cinder consists principally of silicate of iron, and because silicate of iron resists ordinary corrosion much better than pure iron the presence of this silicate of iron is responsible for the fact that it resists corrosion better than steel.

Because microscopic photographs of wrought iron show streaks of cinder in irregularly distributed groups, the argument has been advanced that therefore it is not sufficient to arrest corrosion; but the fact of the matter is that these easily discernible streaks shown by the microscope are only the streaks of surplus cinder, and many of the elongated coatings of the original iron crystals are so thin that even the microscope fails to show them.

This elaborate doctrine may be expressed in four words: "Cinder coated iron fibers." It not only represents the sole claim of the manufacturers, but of outsiders as well, who defend wrought iron. Incidentally, before attempting to point out the absurdity of the "cinder coated iron fiber" theory, it may be mentioned that its origin-

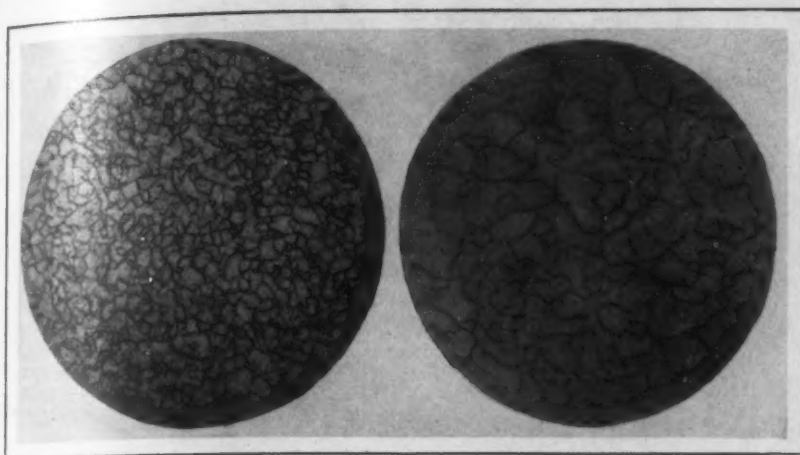


Fig. 7—Genuine Open Hearth Iron

Fig. 8—Genuine Open Hearth Iron

ators have never produced a ray of evidence to substantiate it.

"Iron Fiber" and Fibrous Iron

The "iron-fiber" idea was undoubtedly suggested by the word "fibrous," used in connection with wrought iron. The origin of this word was practical and not scientific. It was first used to describe the appearance of the fracture.

Its selection was unfortunate. Yet, even to the unaided eye, the fracture is never entirely fibrous, for many portions of almost any large fracture show a distinct crystalline structure. In this way we began to speak of "fibrous" iron, until now it has become so firmly entrenched in practical and scientific thought that a majority of practical and many scientific men accept it as gospel without questioning. In fact, there can be no objection to the use of "fibrous" to describe the appearance of the iron after fracture or after etching with acids. The words "fibrous" and "crystalline" are used to describe the appearance of steel fractures, and as a matter of fact the fractures of many steels appear even more fibrous than those of wrought irons. But when the meaning of "fibrous" is distorted into "fibers" and thence into "iron fibers," it is time for someone to object.

The fibrous appearance of wrought iron when fractured, and after subjection to the action of acids, is due entirely to streaks of cinder ("surplus cinder") and not to "cinder coated iron fibers." When subjected to a physical strain the stresses follow the lines of least resistance, along the cinder streaks, and fracture takes place along these lines, leaving the broken area irregular or fibrous. The fibrous structure exhibited on immersion in acids is likewise due to the greatest action taking place along the cinder streaks; and the appearance of the iron skeleton remaining is governed entirely by the arrangement of the "surplus" cinder in it before immersion in the acid.

No Elongation of Crystals in Rolling

If wrought iron consists of "iron fibers" it should reveal, when examined under the microscope, an entirely different structure from those of low carbon steels and carbonless open hearth irons, which are admittedly crystalline. If the structure and arrangement of the ferrite grains in wrought iron is no different from that in steel or carbonless open hearth iron, then all three are fibrous, or all three are crystalline. Figs. 1, 2 and 3 show identical structures, as far as the iron is concerned. These microscopic photographs represent typical structures of low carbon steel, carbonless open hearth iron, and wrought iron, respectively.

The ferrite in Fig. 3 is identical with the ferrite in Figs. 1 and 2. Wrought iron is as truly crystalline as any open hearth steel or iron. If the slag were absent in

wrought iron, it would be impossible to distinguish it from carbonless open hearth iron.

The champions of wrought iron inform us that the crystals of iron become elongated during rolling, thereby being converted into "iron fibers." Steel, too, must consist of "iron fibers," for rolling would necessarily elongate its crystals to even a greater extent, since it is usually rolled from much larger sections. The crystals of iron are not elongated during rolling of the ingot into sheet bars, neither are they elongated during rolling of the puddle ball into muck bars, because crystals of iron do not exist in either. The temperature of the iron during rolling is far above the point at which iron crystals form,

and the iron does not crystallize until after the muck bar is finished. The same is true of sheet bars rolled from ingots.

That iron crystals are not present in the metal while being rolled at the usual rolling temperature can be demonstrated very nicely by allowing the slabs from the blooming mill to cool to various temperatures before finishing into sheet bars. The crystals are elongated in the finished bar only when the finishing is done after the iron has cooled to about 750 deg. to 800 deg. C. Fig. 4 shows this elongated structure produced by rolling a carbonless open hearth iron after cooling to approximately 750 deg. C.

The writer has examined over 200 sheet bars after rolling at observed temperatures. Over 50 of these were rolled at 750 to 800 deg., and in every case the ferrite grains were elongated as shown in Fig. 4. On the other hand, the remaining bars (150 at least) were rolled at temperatures ranging well above 800 deg. and in every case the ferrite grains appeared normal as shown in Fig. 2. This proves conclusively that the crystals are not formed until the rolling is completed, under normal working conditions.

As further proof of this the iron shown in Fig. 4 was heated to 600 deg., 700 deg., 800 deg., 850 deg. and 870 deg., respectively, and in each treatment the temperature was maintained 24 hours. After each treatment the elongated grains were absolutely unchanged. However, on heating to 920 deg. C., well above its A_3 point, the grains were restored completely to their normal condition, showing that at this temperature the iron again became amorphous and recrystallized on cooling. Fig. 5 shows the result of heating to 920 deg. and cooling with the furnace. Fig. 6 shows absolutely negative results after holding at 870 deg. C for 24 hours.

As to Cinder Coating of Iron Fibers

Again, there is no objection to the use of the word "fibrous" to describe the fracture of wrought iron or its general appearance after etching with acids; but it is both wrong and misleading to base claims for it on the existence of "iron fibers" or "elongated iron crystals."

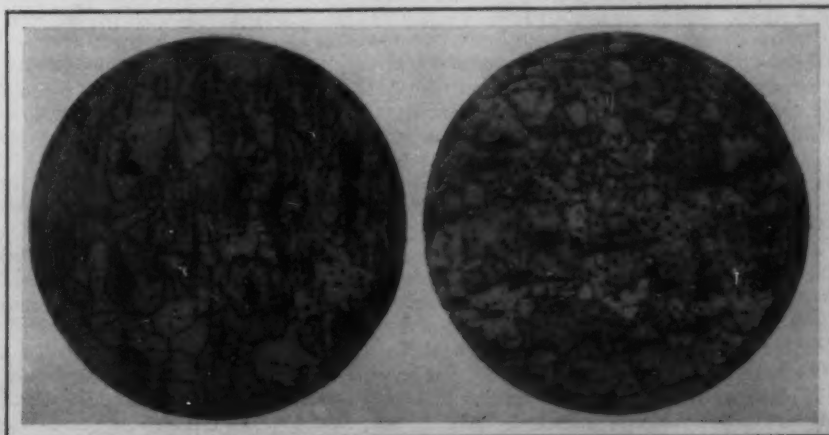


Fig. 9—Genuine Wrought Iron

Fig. 10—Genuine Wrought Iron

There is weak practical evidence upon which the "iron fiber" theory is based, but there is absolutely no evidence, either practical or theoretical, upon which to base the hypothesis that covers each "iron fiber" with a "minute capsule of cinder." The possibility of argument, however, has been adroitly precluded by assigning almost infinite dimensions to the cinder capsules, the walls being "so thin that even the microscope fails to show them." Under these circumstances it is puzzling to know how the doctrine was evolved.

It will be worth while to consider how thin these ultramicroscopic walls of cinder really are. The naked eye can easily see a line 1/1000 in. thick. The microscope easily magnifies 1500 diameters. Observing a line under this power it appears 1/1000 in. thick. This is its apparent thickness. Its real thickness is $1/1500 \times 1/1000$, or 1/1,500,000 in. This the microscope will easily detect.

Again, by comparing the boundary lines between ferrite grains or groups of grains in wrought iron and steel, they are found identical as to shape and thickness. In fact, after the same etching, the writer has found the boundary lines to be even thinner than in steel. Yet there is room for protecting slag! The accompanying microphotographs are shown for comparison.

Concerning the theory of a cinder coated iron fiber, Professor Sauveur in *Electrochemical and Metallurgical Industry* for April, 1907, has the following to say:

"From the above description and accompanying illustrations it will be evident that the ferrite of which wrought iron is composed does not assume a fibrous structure, the slag alone being drawn into fibers. Wrought iron, therefore, should not be described as being fibrous; for, leaving aside the presence of slag, it is as distinctly crystalline as steel. The general belief in the fibrous character of wrought iron, however, is so deeply rooted that even many modern writers of repute still refer to that metal as being fibrous, and many qualities have been and still are claimed for wrought iron because of the presence of these fibers, which are denied to steel owing to its crystalline character."

"It may be that wrought iron resists corrosion better than steel, that it is more weldable and possesses to a greater degree other characteristics dear to the blacksmith; but such claims cannot be based on the fibrous character of the metal, and still less as recently attempted in print, on the presence of iron fibers each one surrounded by a thin coating of slag, a clever but altogether visionary arrangement."

Uniformity of Wrought Iron

Is there any relation between the characteristics of wrought iron and of steel on one hand and their behavior in service on the other?

Wrought iron, among practical users, has the reputation of being uniformly good. The smith finds it ever reliable in its hot working properties. It always welds perfectly and always gives about the same satisfaction in service. This sameness or uniformity surely is the result of some uniform characteristic of the metal itself. The tinner and plumber find universal satisfaction in the use of wrought iron. After finishing his roof, the tinner is done. He hears no complaints of leaking sheets. It lasts almost a lifetime. To substantiate this, reference is made to the testimony given in print from time to time of users who have observed roofs to last 40 years and more. It is not the case that a small number of the sheets become defective and condemn the whole roof. Every sheet is uniformly good. And when the roof is torn away, after decades of service, the sheets are found to be uniformly bad. Corrosion has done about the same damage to every one. The same facts apply to wrought iron pipe lines.

Again, surely this uniformity in service does not bear any relation to a non-uniform characteristic of the wrought iron itself. The physical structure of wrought iron is exceedingly irregular. The cinder is scattered through it in streaks, lakes, spots, puddles. Heterogeneous describes it perfectly. Is it reasonable to believe that this haphazard structure has any relation whatever to the marked uniformity of behavior of the metal in service? But wrought iron possesses a marked characteristic which is in perfect harmony with its conduct in service. The metal is perfectly uniform chemically and is surprisingly free from segregation. The chemical analysis of the muck bars may vary, but each in itself is a chemical unit. It

rarely contains carbon or manganese, while the sulphur and phosphorus are evenly distributed. This marked characteristic of puddled iron is not receiving the credit it deserves. This uniform distribution of the chemical elements in the metal is in perfect harmony with its conduct in service, and to this one characteristic we attribute the superior rust-resisting qualities of wrought iron. The "cinder coated iron fiber" theory has been shown to be fallacious, and the manufacturers themselves admit that the great mass of the cinder is "surplus" cinder, and therefore plays no part in corrosion.

Non-Uniformity of Steel

Uniformity in service results directly from chemical uniformity of the metal. Can we now apply this same line of reasoning to steel? Let us see. What does experience say? It tells us that steel is notoriously irregular. The smith finds it a puzzle. Out of the same "batch of stuff" one piece will weld perfectly and work evenly; the next piece welds less perfectly and works not so well, and another piece refuses to weld, is hot short and is consigned to the scrap barrel. The quality is not uniform, though all the pieces come from the same ingot.

A steel roof often begins to leak in a comparatively short time. Examination reveals the fact that only a few of the sheets are corroded, and these only in small patches; other sheets are in fair condition, and the great majority are in excellent condition. A few bad sheets condemn the whole roof. There is a conspicuous lack of uniformity in all steel roofs, especially large ones on which many sheets are used.

Here we find the most serious drawback to steel—its lack of uniformity in resisting corrosion. What characteristic is responsible for this caprice in service? Certainly not its homogeneous physical structure, for if this had any great influence it should render the steel either uniformly good or uniformly bad. But chemically steel is very irregular. Influences beyond the power of man to alter are at work during the cooling of liquid steel, and segregation of the impurities takes place, leaving the solid steel irregular chemically. This characteristic is in perfect harmony with the conduct of steel in service. Its chemical irregularity is entirely responsible for its irregularity in service.

Those who became convinced long ago that chemical irregularity was largely responsible for the failure of steel to resist corrosion declared against "segregation." Fortunately, the announcement of the electrolytic theory by Dr. Whitney and the public-spirited researches of Drs. Walker and Cushman came about this time. The manufacturers were urged to make purer steel which would be less susceptible to electrolysis. Manganese was pointed out as one of the injurious impurities. Segregation, obviously, could be avoided by eliminating those impurities responsible for it. By reducing the carbon and manganese to almost nothing, eliminating the phosphorus and keeping the sulphur low, a metal was produced which was remarkably free from segregation. To this metal the Newport Rolling Mill Company gave the trade name, Genuine Open Hearth Iron.

Iron or Steel?

There have been objections to the use of the name "iron" to cover the product of the open hearth furnace. Metallurgists object because they believe it will make chaos of the present accepted nomenclature. This view, however, is unwarranted and perhaps a trifle conservative. The present nomenclature is the outgrowth of conditions, as Campbell has said, and no iron-clad rules can be laid down to cover future changes in the growth of business and experience. We have at present a nomenclature which defines "wrought iron" and "steel." There is no line of demarcation between "iron" and "steel." "Iron" does not mean "wrought iron." If the product of the puddling furnace is meant it is but little effort to say "wrought iron." The name "iron" belongs to the element. When we speak of elementary iron we do not have to add the word "elementary" to indicate our meaning. Yet no confusion results. So, as Campbell has indicated, the outgrowth of business and experience demands a change, and we apply the name "iron" to the carbonless product of the open hearth furnace because it is more worthy of the name than wrought iron, since it is much nearer the purity of the element.

Death of Milton P. Higgins

Milton P. Higgins, Worcester, Mass., for many years a conspicuous figure in the industrial life of the country, and also as an educator specializing in questions of engineering and trade schools, died at his home February 8, aged 69 years. His life was full of large successes. When Ichabod Washburn established the Washburn Shops of the Worcester Polytechnic Institute, Mr. Higgins was chosen as the man to carry out the idea of the founder, of giving students of mechanical engineering practical machine shop work in the surroundings of a commercial plant, and he pursued the task for 27 years as superintendent and supplemented it as a trustee of the Institute until his death.

The designer and builder of the first hydraulic elevator, Mr. Higgins developed the principle along commercial lines at the Washburn Shops, and later, with Prof. George I. Alden, his life-long friend and business associate, he carried on the manufacture of the elevator as the Plunger Elevator Company. With capable associates he was an important factor in building up the Norton Company from a very humble beginning. He was an essential factor in the establishment and development to large proportions of the Norton Grinding Company. Under his guidance a small pressed steel industry has grown to be the large business of the Worcester Pressed Steel Company. His campaign of education, to inspire the establishment of trade schools to take care of the increasing demand for skilled mechanics, has proved of the utmost importance. He was the chief adviser in the establishment of the shops of the Atlanta School of Technology and of the Miller Manual Training School of Virginia. He had been a vice-president of the American Society of Mechanical Engineers.

Mr. Higgins was a man of exceptionally strong personality. He was essentially an investigator, and once he had arrived at a conclusion he carried it through with intelligent force. He was a good judge of men, as is demonstrated in the notable group of his business associates. His contributions to American industries have been of great importance both directly and indirectly.

Milton Prince Higgins was born in Standish, Me., December 7, 1842. His father carried on successfully a farm at Standish, and among other enterprises conducted a general blacksmith and machine shop. Here Mr. Higgins got his first taste of mechanical work and developed a love for machinery. Rather than take up farming; he went to Manchester, N. H., at the age of 17 years, and served an apprenticeship in the shops of the Amoskeag Mfg. Company. There he became impressed with the value of an extended education and began to study and to lay aside money for a college course. In this way he was able to work his way through Dartmouth College, where he graduated in 1868 with the degree of bachelor of science. It was during this period that John Boynton had established the Worcester Polytechnic Institute and Ichabod Washburn had donated the money for the establishment of the Washburn Shops. Mr. Higgins was selected as a young man well qualified to be the superintendent. While he was waiting for the completion of the buildings he went with the Washburn & Moen Mfg. Company as a draftsman, serving under the late Charles H. Morgan.

While at the Washburn Shops the attention of Mr. Higgins and Prof. Alden, who was head of the department of mechanical engineering, was drawn to a struggling pottery factory in Worcester, which had attempted the manufacture of emery wheels by the vitrified process.

The business was acquired and Mr. Higgins became the president, Prof. Alden the treasurer, Charles L. Allen the general manager, and John Jeppson the superintendent. They removed the industry to Barber's Crossing and developed it into one of the most successful manufacturing concerns in New England, employing 1200 people in its plants at Worcester, Mass., Niagara Falls, N. Y., Chipewawa, Canada, and Wesseling, Germany.

In 1896 the trustees of the Polytechnic Institute decided that the commercial end of the Washburn Shops had become too important, and as a result sold the hydraulic elevator business to Mr. Higgins and Professor Alden. They resigned their connection with the Institute, and with Mr. Higgins as president and Professor Alden as treasurer established at Barber's Crossing the Plunger Elevator Company, which carried on a large and remunerative business until its absorption a few years ago by the Otis Elevator Company. In 1904 Mr. Higgins acquired the Worcester Ferrule & Mfg. Company, a small business which in a very few years, since its reorganization as the Worcester Pressed Steel Company, has doubled and redoubled its plant and business. In the Norton Grinding Company Mr. Higgins has been an important factor. In less than a decade this company's works has become one of the largest and most influential in the world for the manufacture of grinding machines.

Mr. Higgins's work for industrial education has had an influence beyond most Americans. He first came conspicuously before the public in 1899 through a paper read before the American Society of Mechanical Engineers in which he advocated a half-time school in which the shops would be operated by a school corporation, while the class-room work would be given to the public schools. A prolonged and profound discussion followed and was the cause of a meeting of the American Society of Mechanical Engineers which was devoted entirely to trade education, and to which Mr. Higgins contributed additional papers. He was appointed by Governor Douglas of Massachusetts a member of the State Board of Education, and there carried on vigorously his advocacy of trade schools. The result was the appointment of a commission in his home city of Worcester of which he was the

chairman, to study the question in conjunction with the State Board. There followed the establishment of the Worcester Trade School in 1908, which embodied many of the original ideas of Mr. Higgins and others which were suggested in his later study of the problems.

In addition to the industries already enumerated, Mr. Higgins was the president of the Manchester Supply Company, Manchester, N. H., and of the Sanford Riley Stoker Company, Ltd., Providence, R. I. He was a director of the Mechanics National Bank of Worcester, was a charter member and an officer for the Society for the Promotion of Industrial Education, and was a member of the Worcester Club. He leaves a widow, two sons and two daughters. One of his sons is Aldus C. Higgins of the Norton Company, and the other is John W. Higgins, manager of the Worcester Pressed Steel Company.

The American Society of Engineer Draftsmen will hold its regular monthly meeting on the evening of March 21, in the Engineering Societies Building, New York City. A paper is to be read by W. T. Walters, Chicago, on the arrangement and lay-out of a machine shop and a lecture is scheduled by Dr. Chas. E. Lucke, professor of mechanical engineering, Columbia University, on the relation of the draftsman to the engineer.



MILTON P. HIGGINS

Foundry Melting and Mixing*

On Cupola Management Success or Failure Largely Turns—An Interesting Account of Early Experience with Semi-Steel Mixtures

BY DAVID M'LAIN†

While employed as a molder in a crucible steel foundry in which coke furnaces or so-called "coke holes" were used for melting I could not help but notice the difference in the metal when different melters were in charge of the furnace. For weeks at a time there was scarcely a complaint made about blow holes in castings. Again it seemed as if we were unable to make castings free from blow holes. The same grades of material were purchased, but for some reason it became a fixed habit for the metal to go wrong at intervals. As the steel casting business was in its infancy in this country at that time, it was considered as one of the mysteries connected with the making of steel castings.

Regenerative Furnaces and "Coke Holes"

We had one 30-pot furnace, but as the business was increasing right along a Siemens-Martin regenerative 24-pot furnace was built. For a time after this was in operation the coke holes were operated only when necessary and by one melter. This melter when in his cups used to blame the blowy castings on the other melter because he claimed the latter was only a "handy man," not a full-fledged melter. All were aware that the new furnaces were a decided improvement over the old ones; but, using the same percentages of the same material that was put into the pots in the new furnaces, a larger percentage of good castings was obtained from the metal made in the coke holes.

In the general bustle of the day's work the real cause of the defective castings was not located by the powers that be. The writer probably would not have become aware of it if the old melter had not drawn my attention to the fact that some of my castings poured of the metal from the new furnaces were bad; and you may believe that I tried at every opportunity to get metal from the coke holes to pour my work. I was not in position to apprise my foreman of this fact, because the old melter had sworn me to secrecy. I had a notion that he used better material than that used in the new furnaces, but later learned that this was not the case.

The Siemens-Martin furnaces were much superior to the coke holes, but the mode of operation was entirely different. Operating the coke holes, the melter was able to try the metal often and if he found a cold pot could give it more attention than could be given in the other furnace; but, considering the average melting, better results were obtained from the Siemens-Martin furnaces and eventually the coke holes were abandoned entirely.

The Bessemer Converter

As the company was desirous of making larger castings it was decided to install a Bessemer converter. An addition was built to the plant, a large jib crane, cupola and converter were purchased and Bessemer steel castings were made. This was the first foundry in the country using Bessemer metal for steel castings exclusively, although castings were poured of Bessemer metal by concerns having iron foundries and that were anxious to make steel castings for their own use.

The Bessemer process did not appear to be a great success for castings at the start. As it was a 7-ton converter, it was not convenient to pour small work, as the jib crane swung in a circle and did not allow sufficient floor space. Bessemer steel is suitable for pouring in ingots, as the metal in ingot form was run through the rolls later, which worked out many of the imperfections; but it is not as suitable for castings which are merely machined. There were many "cold blows" and this was not conducive to good steel. In the beginning very little attention was given to the melting of the metal in the cupola. Sometimes the metal from the cupola would be

cold; at other times it would be held in the cupola ladle much longer than usual before going into the converter, and then it was noted we invariably had a cold blow.

Eventually more attention was given to the cupola in order to get hotter metal. This they were soon able to do, learning that with a less percentage of silicon in the mixtures an extra amount of steel scrap could be used in the cupola. Aware of this fact, I was more impressed than ever with the fact that good melting made quite a difference in the castings.

For economical and other reasons our company decided to install an open-hearth furnace of 20 tons capacity, which necessitated the rebuilding of the entire plant and the dismantling of the Bessemer outfit. A few heats demonstrated to all that it was the ideal metal for steel castings.

In a short time there was a change of melters and our losses on defective castings ran up rapidly. The trouble was blow holes and the cause poor melting. Finally a good melter was secured and at once the casting losses were reduced.

I was offered charge of a small crucible steel plant which had been a failure under the management of a very capable iron founder and the owners were amazed to learn that I did not require different grades of material from what had been used. Later they said: "Your ability at the start was questioned because you did not give us a big list of material to purchase." Imagine their surprise to learn that good castings, free from blow holes, could be made of the materials formerly used and simply because good melting was being done.

A Brass Foundry Experience

A few years later when arranging a plant to make gray iron and steel castings the owner neglected to state that he wanted to make non-ferrous castings until it was too late to install a brass foundry department. Hearing of his desire, I told him we would melt brass in the crucible steel furnace. He claimed brass foundrymen would not use oil for melting purposes. (This was 14 years ago.) I wondered why, but determined to seek advice from men who knew all about it and was told not to use oil as it would spoil the metal. This must sound strange to those who are melting brass with oil today, although many still use coke.

We made tons of high-grade, non-ferrous castings, but were treated to a surprise while doing so. Our steel crucibles were often in fairly good shape after being abandoned for melting steel, and I believed were capable of a few heats at least for melting brass. To cut a long story short, these old steel pots gave us an average of 11 heats in brass, many running 16 heats. This led me to try a new steel pot for brass exclusively and this pot stood up for 52 heats. The brass mixtures were melted in the steel furnace after the last pot of steel was pulled and oil shut off, for quite often the temperature of the furnace was so high no extra oil was used to melt the metal; but the general practice was to use oil. How was it possible to use these crude furnaces for this purpose? Good melting.

How is it possible for one man to use 30 to 50 per cent steel scrap while others can only use 10 per cent? To answer the latter question a more definite explanation is required than simply to say "good melting." It really requires scientific melting.

Scientific Melting

How is it possible for one man to use 30 to 50 per cent steel scrap while others can only use 10 per cent? To answer the latter question a more definite explanation is required than simply to say "good melting." It really requires scientific melting.

To get the best results from the cupola the details must be well arranged. The proper amount of air must be de-

*From a paper read before the Pittsburgh Foundrymen's Association, March 4.

†Manager Milwaukee Correspondence School, Milwaukee, Wis.

livered through pipes proportioned to offer the least resistance, tuyeres should be made to allow the air to enter the cupola by volume; the material should be charged intelligently—the size of the charge to be determined by the size of the cupola. The coke should be high in carbon, which means low ash, and it must be low in sulphur. Much good, high carbon coke is being made today; but when purchasing you should specify the carbon and sulphur content. Then when the coke is still on track samples should be sent to a commercial chemist for report, which will only cost a few dollars per car, in order to learn whether you have been shipped coke up to specification. If the coke is right, unload it; if not, fight it out before unloading. There is no excuse whatever for the use of poor coke, because if you know good coke and specify what you want, the coke companies will supply it. Mistakes in shipments will happen, of course, but an analysis of each car of coke will prevent mistakes eventually.

An eastern client received a car of poor coke and wrote me that the iron came hard and dirty. His company did not want to have the coke analyzed, as it was supposed to be a well-known brand, but finally did so, only to find a total of 33 per cent. ash and volatile matter. Now the coke company did not offer to replace this car, but insisted that as the sulphur was right, 0.75, it did not matter about the other elements!

Even though you have to pay more money to get the best coke, pay it, because less coke is required to melt the iron. And when you learn that some men are melting 15 lb. of iron with 1 lb. of coke between charges, when you learn that not less than 12 lb. of iron should be melted with 1 lb. of coke between charges, you will then believe that scientific melting means more to the foundry than you have ever given it credit for.

Converter Operation Requires Experience

Some claims that have been made that lead the uninitiated to believe that all you have to do is to install the cupola and converter and that "your gray iron foreman will be competent to do the rest." Can you imagine a steel foundryman, who never worked a day in an iron foundry probably, going into a general jobbing gray iron shop and directing the men so that they will know he is their superior at every stage of the game? I say "No" most emphatically, and the same holds good in the converter steel shop, only more so. The superintendent of an open-hearth or crucible foundry encounters an entirely different proposition when he assumes charge of a converter plant. He may be a very capable man in either of the above, but melting conditions demand that he become master of good cupola practice.

Some converter shops are using coke of the following analysis:

Carbon, 76 to 82 per cent.
Volatile matter, 2.50 to 4 per cent.
Ash, 12 to 18 per cent.
Sulphur, 0.90 to 1.10 per cent.

Now this is lamentable. One plant had the tuyeres set high enough so that two tons of iron remained in the cupola before tapping. What can they expect using this poor coke and allowing the iron to remain in cupola for some time to absorb more sulphur from the fuel? High tuyeres and poor coke were not all that was wrong with this melting outfit; they were using high blast and oxidizing the silicon, carbon and manganese. One would think they were trying to blow steel in the cupola instead of the converter.

Mixing by Analysis

The best castings are made when some man in your shop is able to mix irons by analysis. This means more than being able to figure a charge or heat when the percentage of elements in the material is known. The man who is responsible for the mixtures must know just what proportion of those elements should be in each charge, and if he is going to pour light or heavy cylinders. He will then be competent to change the mixtures for the next charge for some other class of castings.

The successful mixer of irons should have a chemist report on each car of pig and coke and he knows that he must order pig iron containing elements most suitable for his castings; he will not order by number. He knows what melting losses to figure against, as well as those

that will be increased, and estimates in advance just the percentage of pig and scrap to use to give him the desired result in the castings. He knows that good melting enables him to carry a lower silicon in the mixture, which invariably means stronger castings. He will have no use for "silvery" or high silicon pig. He is aware that his cupola is not a blast furnace, therefore will have no use for limestone for short heats. He uses steel in the mixtures to make stronger castings.

It is not necessary to have a chemist in your employ unless you melt a large tonnage; but it is much better to employ one than to send samples to the so-called "specialists" who mix iron by mail, as they "have too many irons in the fire." We need the chemist in our business. When you find one who will take active charge of the cupola—one who has tact, so that he and the foreman work hand in hand—keep your eye on him, as he is liable to make a "hit."

Since 80 to 90 cents of every dollar spent for the foundry has been spent before melting begins, you can either make a profit or a loss by mixing and melting the material scientifically or by guess. I repeat that some man in your shop should do the mixing.

A company making agricultural castings formerly had its mixtures made by specialists, and although straight mixtures were used throughout the heat the analyses of the castings would show from 2.75 to 1.90 silicon. Put when the foreman began to do the mixing better and stronger castings were made and the analysis of castings seldom runs less than 2.15 or more than 2.25 per cent. silicon, 0.07 to 0.08 sulphur, 0.55 to 0.65 phosphorus and 0.50 to 0.65 manganese.

First Experiments with Semi-Steel

A company of which I was foundry superintendent had just built a foundry to make iron, steel and brass castings, having previously purchased all castings from jobbing shops, which practice proved very unsatisfactory as the castings consisted of parts for air brake equipment used on street cars. The records of the machine shop proved that the loss on small cylinder head castings ran as high as 60 per cent., and this loss was not discovered, unfortunately, until the castings were machined and put to the test, which was 200 lb. air pressure.

Investigation proved there were also large losses on this particular cylinder head pattern in every foundry in which the pattern was placed. At that time the pattern was in a Detroit foundry having a good reputation on this class of work, and as their losses were only about 50 per cent., our machine shop superintendent advised that we allow the pattern to remain there. To cut a long story short, the pattern was called in and my troubles began. In a short time the loss was reduced to 35 per cent., and as a plan had been devised to test castings before machining (not a final test), the company was immensely pleased with the showing.

But to think of a loss of 35 per cent. on iron castings, when I had been able to make steel castings with a loss of 2 per cent. and under, was very discouraging, I assure you, and I put every effort and spare moment on this particular pattern. Experts were called in—chemists had their say—but without bettering our product. Foundry friends all advised that the pattern be changed; but our manager would not listen to it, as he claimed when the metal was right castings were right, and later developments proved that he was correct.

The writer gave much study to the use of steel, also to the thought that manganese must be used; but on referring to textbooks, found the following information:

"Manganese increases the saturation point of iron for carbon."

"Manganese will remove sulphur if used in the ladle."

"Manganese is a hardening element above 0.85."

"Manganese is not good for use in the cupola because the temperature is not high enough to melt it."

"Manganese converts graphitic carbon to combined carbon."

"Would steel increase the temperature of the metal? No."

Now with all this expert opinion against me, I felt at times as if it were better to let steel alone; but several incongruities in the above statements left a loophole to work on. The statement that manganese converts graphitic carbon to combined carbon appeared all right if there

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was no silicon in the mixture, but as silicon converts combined carbon to graphitic carbon, what would happen if both manganese and silicon were fairly high? Good thought. All textbooks inform you that steel is used to reduce carbon; but how are you going to make soft castings of light section if total carbon is low? It was apparent that if manganese increased the "saturation point of iron for carbon" it was necessary to use it; because if carbon is low, light sections will be hard. But as silicon must be low for close-grained metal, probably a low silicon, high carbon metal would solve the problem, and it did.

When figuring the estimated analysis of the material in charge entering the cupola, the total carbon was only 2 per cent. Now, it did not matter how high the silicon was in the castings, they would be hard if the total carbon was only 2 per cent.; but when metal was poured and analyzed it was found that the carbon had increased to 3.58 per cent., and these light castings were soft, although silicon was low.

The steel and manganese did exactly what they were calculated to do, namely, increased the total carbon, reducing sulphur and allowing the lower silicon mixture to be used, thereby giving a very close-grained metal, free from segregation and blow holes.

Machine Shop Results

After solving this problem, what effect was noticeable in the machine shop? When it is known that pattern sections were as light as 5/16 in. to 3/8 in. and using 30 to 40 per cent. steel, the castings were run through milling machines to the tests with a loss of 2 per cent. to 3 per cent.—in some instances with less loss—you will agree that the results were wonderful. It truly was semi-steel, containing 30 to 50 per cent. steel. The transverse strength increased from 2200 to 2400 lb. up to as high as 4400 lb. Quite often we had men sledge these light cylinder heads with a 36-lb. hammer, but the metal would not begin to crack until it had sunk in considerably.

In 1903 a full description of my method of using steel and manganese in the cupola was sent to one of our leading metallurgists, and the following extract from his letter is quoted to give you further confidence in semi-steel:

You have hit on a point which bears out all my years of contention on the oxidation of iron in the melting process. Where you use such high percentage of steel, you necessarily have a higher temperature in the melt, and with this higher temperature any addition of manganese means a reaction with the oxygen present, from the unavoidable burning of the steel in the charges. In ordinary cast iron this cannot take place, as the temperature is not high enough, hence manganese is not a good thing there. I presume that you must lose quite a lot of manganese by this process, which shows that it is effective and does the work it is put in for. I can only congratulate you on this work, and hope that you may reap some good returns from it. Nevertheless, it seems a pity that others should be made to lose money all the time for the want of knowing this.

Some foundrymen who are unable to make a close grained metal requiring high strength or that must stand hydraulic or other tests, use expensive alloys; but when it is known that cheap steel scrap used in cupola mixtures will make light castings with a transverse strength of 2600 to 3200 lb. and from 3200 to 4500 lb. for medium and heavy castings, do you not agree that steel scrap solves your problem? If a still stronger metal is required, then try alloys.

Methods to Be Followed

In making metal for "high" grade castings, steel and other scrap with pig are placed on the bed, making as many charges for semi-steel as desired, following with usual mixtures. If metal for dies, anvil blocks or castings of like character is desired, semi-steel may be made on the latter part of the heat. When good practice is followed there will be no "bunging" up of your cupola and no harmful effects to later charges of regular mixtures.

No more coke is necessary to melt steel mixtures than gray iron, but it is best to use a heavier split of coke between the last charge of semi-steel and the following charge to prevent the latter from melting through. Contrary to all previous advice offered by "experts" the steel melts more quickly than the pig iron.

Steel scrap should never be melted in the ladle, but charged in the cupola, as a high temperature is necessary to melt steel properly, in order to liberate all gases; hence the necessity of good melting must be apparent.

Steel borings and turnings may be used to advantage in the same manner as for gray iron. No boxes or cans are

necessary. All kinds of steel scrap, such as steel foundry scrap, gates, risers, boiler clippings, punchings, shearings, structural material, angles, I-beams, ties, channels, rails and railroad scrap may be used; also a percentage of wrought iron. You may use from 10 to 30 per cent. steel in castings of light sections, and 30 to 50 per cent. steel scrap may be used in castings of heavy sections. Many foundries use 45 per cent. steel in heavy gas engine cylinders. Men who have tried to use 30 to 40 or even 50 per cent. steel and were not successful have not much faith in semi-steel, but in every single instance which came under my observation their melting conditions were not right.

Cupola Capacities

I have been successful in arranging cupolas which had been poor melters so that the maximum amount of metal was brought down per hour, and have proved that any cupola may be arranged to melt 10 lb. per hour per square inch of cupola area, when just the proper amount of coke is used. The following table may prove of interest to you:

A 30-in. cupola should melt	3 3/4 tons per hour
A 36-in. cupola should melt	5 tons per hour
A 42-in. cupola should melt	6 1/2 tons per hour
A 48-in. cupola should melt	9 tons per hour
A 54-in. cupola should melt	11 tons per hour
A 60-in. cupola should melt	14 tons per hour
A 66-in. cupola should melt	17 tons per hour
A 72-in. cupola should melt	18 to 20 tons per hour

You will find cupolas melting faster than this, but in every such instance we have demonstrated that it is a mistake to melt faster than quoted, unless on very long heats.

Generally, melting conditions are favorable when melting steel, but not so with iron melted in the cupola. The high carbon, silicon, sulphur and phosphorus in iron mixtures melted with coke produce more gases and impurities and a higher percentage of manganese should be used to free the iron of those impurities; but I will admit if the cupola is not melting up to capacity, the necessary temperature to cause perfect combustion is lacking. The claims made by eminent authorities that there must be a vast difference in the same brands of pig iron may easily be exploded—not by some mysterious laboratory experiment, but by scientific melting and mixing of iron which is possible when some man in your shop is capable of doing so.

Steel Corporation Orders 5,454,200 Tons

The report of unfilled orders of the United States Steel Corporation at the end of February shows a total of 5,454,200 tons, against 5,379,721 tons on January 31, an increase of 74,479 tons. Some of the larger rail orders taken in January and reported in that month were not entered until February, so that these figure in the current statement. The total of orders on the books at the end of February is the largest since December 31, 1909, when it was reported at 5,927,031 tons. At that time, however, only quarterly statements were being made, and three months later, on March 31, 1910, the report showed 5,402,514 tons. The amounts reported by months, beginning with January, 1911, are as follows:

Feb. 29, 1912.....	5,454,200	July 31, 1911.....	3,584,085
Jan. 31, 1912.....	5,379,721	June 30, 1911.....	3,361,058
Dec. 31, 1911.....	5,084,761	May 31, 1911.....	3,113,187
Nov. 30, 1911.....	4,141,955	April 30, 1911.....	3,218,704
Oct. 31, 1911.....	3,694,328	Mar. 31, 1911.....	3,447,301
Sept. 30, 1911.....	3,611,317	Feb. 28, 1911.....	3,400,543
Aug. 31, 1911.....	3,695,985	Jan. 31, 1911.....	3,110,919

The totals at the close of the various years have been as follows: 1902, 5,347,523 tons; 1903, 3,215,123 tons; 1904, 4,696,203 tons; 1905, 7,605,086 tons; 1906, 8,498,719 tons (the high record); 1907, 4,624,552 tons; 1908, 3,603,527 tons; 1909, 5,927,031 tons; 1910, 2,674,757 tons; 1911, 5,084,761 tons.

The report of the American Railway Association showed the net surplus of cars on the railroads of the United States and Canada to be 7842 on February 28 against 13,958 two weeks previous, the reduction being 6116. In coal, gondola and hopper cars the surplus reported was 10,239 and the shortage was 8153, making the net surplus 2086. Since January 1 the idle cars have been reduced by 128,000, whereas in the same period a year ago they rose from 106,900 to 189,800.

The Tariff Hearings at Washington.

Protests Against Proposed Reductions in Duties by Eastern Manufacturers of Bar Iron, Horse- shoes, Bolts, Spikes, Nuts and Builders' Hardware

On March 6 the Finance Committee of the United States Senate gave the Eastern manufacturers of bar iron, horseshoes, bolts, railroad spikes, nuts and builders' hardware an opportunity to submit testimony regarding the serious effect on their industries of the duties proposed in the Underwood tariff bill. Extracts from the testimony are presented below.

The Eastern Bar Iron Industry

Statement of James Lord, Representing the American Iron & Steel Mfg. Company, of Lebanon and Reading, Pa.

MR. LORD. I am representing to-day, in company with eight gentlemen who have come from different parts of the East, 25 rolling mills that manufacture bar iron east of the Allegheny Mountains, and that stretch from Knoxville, Tenn., to Portland, Me. These companies sell their products, for the most part, east of the mountains, and largely to Atlantic coast and Gulf points. Consequently, this bill, if passed, would put the burden of foreign competition largely on these Eastern mills, because the freight we have from our different mills to the coast points is just about equivalent to the freight from the European competing points. For instance, our freight to New York would be 10 cents per 100 lb., while practically the same rate could be obtained from Liverpool or from Antwerp.

THE CHAIRMAN. How many men are employed in your establishment?

MR. LORD. Four thousand.

THE CHAIRMAN. How many men are employed in the industry?

MR. LORD. As nearly as I have been able to estimate, there is \$30,000,000 of capital invested in the rolling mills I represent, and there are 20,000 employees.

Would Bear Most Heavily on Labor

This would bear most heavily upon our labor, because labor is high in the United States. This is the greatest labor market in the world, and the labor is coming over necessarily from other countries. Consequently, when we get the price of labor up, it is impossible to get it down. At least, we know of no way that has been discovered so far of getting it down.

SENATOR SMOOT. You have no desire to get it down unless it is absolutely necessary, have you?

MR. LORD. We are anxious to keep it up. In Germany, which would be a competitor with us, labor is not protected to any extent by the high tariff of that country, because it has a superabundance of labor. Consequently, Germany has not yet reached the point where its labor can be affected by the tariff.

THE CHAIRMAN. Do you happen to know anything of the difference between the wages paid in Pennsylvania and in the other States that have these industries and those paid in Germany?

MR. LORD. As nearly as I can find out, we pay in rolling mill work about double what the German do. The wages paid in Belgium are the lowest of any of the European countries I have heard of, and in England they are the highest—that is, in the competing countries.

THE CHAIRMAN. Do you export any of your product?

MR. LORD. We export practically nothing in the way of bar iron. We send a little to the West India Islands. Further, in regard to the Canadian situation, they have a high tariff against us. They get our scrap iron free, and it places them in a position to throw their surplus product into this country; and it does not seem to me to be good business to give them that opportunity without being able to hit back.

As nearly as I can figure this proposed ad valorem duty in House bill No. 18,642, it would bring the duty on bar iron to \$2 a ton. The present duty is \$6.72, and under the Dingley act it was \$13.44. So that this proposition is getting down pretty close to free trade. It would be actually free trade so far as the results would be concerned with the Eastern mills.

THE CHAIRMAN. It would not hurt so much the mills west of the Alleghenies?

MR. LORD. The large steel companies in the Middle West would be protected in all of their interior trade by the distance from the coast.

Business Not Prosperous at Present

SENATOR SMOOT. Under the present rate, is your business prosperous?

MR. LORD. Our business is not prosperous or profitable at the present time, and was not during the past year.

SENATOR SMOOT. Under the present rates your profits have not been unreasonable, have they?

MR. LORD. Under the present rates our profits did not enable us to cover the dividend we paid last year—7 per cent. In other words, we did not earn more than half of our dividend.

SENATOR SMOOT. You paid your dividend from your surplus?

MR. LORD. From our surplus.

SENATOR SMOOT. Prices are very low in this country at the present time, however, are they not?

MR. LORD. Prices are extremely low.

SENATOR SMOOT. And they are rather high abroad, are they not?

MR. LORD. I think they are higher in England than in the other countries; but England is not able to stand the competition of Germany, because a great many of the German iron and steel goods go into England.

THE CHAIRMAN. Are the concerns you represent running on full time now, or what proportion of their maximum output are they making?

MR. LORD. They are running on very slow time. Several of them have shut down altogether. In fact, half a dozen or more of them have shut down altogether.

THE CHAIRMAN. And those that are running are running on about what percentage of their normal full output?

MR. LORD. I am unable to say exactly, but I doubt if any of them are running as much as 80 per cent.

THE CHAIRMAN. What is your own concern doing?

MR. LORD. We are running about 75 per cent.

THE CHAIRMAN. Have you anything further to state to the committee?

MR. LORD. Yes, sir, in regard to bar iron. The gentlemen who are here were sent as a committee from a meeting of the Eastern bar iron manufacturers; and they have prepared a short brief which is signed by eight of them.

[The brief referred to will be found at the end of Mr. Lord's statement.]

The Bolt, Nut and Spike Industry

MR. LORD. With your permission I would like to say something now in regard to the bolt and nut and spike industry. Owing to a mix-up in dates, the gentlemen who were to speak in regard to that matter—probably there would have been 15 or 20 of them here, otherwise—were unable to get here. I did not expect to say anything about it, and I am practically alone.

THE CHAIRMAN. I wish you would leave a list of those who had intended to be present with the stenographer.

[The list referred to was subsequently handed to the stenographer by Mr. Lord, and is as follows: W. F. McKenzie, vice-president Pittsburgh Screw & Bolt Company; W. S. Comly, Russell, Burdsall & Ward Bolt & Nut Company; W. S. Hitchcock, vice-president Upson Nut Company; Ralph H. Plumb, Buffalo Bolt Company; George S. Shimer, Milton Mfg. Company; Marshall D. Zehnder, Scranton Bolt & Nut Company; Clement R. Hoopes, Hoopes & Townsend Company; Henry Holt, Lamson & Sessions Company.]

MR. LORD. The present bill puts spikes, nuts and washers on the free list, with a duty of 15 per cent. on bolts. All of the concerns manufacturing these items, with the exception of spikes to some extent, are small concerns, as compared with the large steel corporations. The large steel corporations to some extent make spikes, but they do not make machine bolts, carriage bolts, washers, rivets, or nuts. There are about 35, as nearly as I can recall, of these manufacturers; and as nearly as I can estimate the capital employed it is about \$50,000,000.

THE CHAIRMAN. How many men are employed in the industry?

MR. LORD. I am unable to say that, but I think in the neighborhood of 25,000 or 30,000. In the first place, spikes are used altogether by the railroads. The nuts and washers are used principally by railroads. So that the effect of putting those items on the free list would be to benefit the railroads altogether at the expense of the manufacturers; and coming at a time when there is practically no profit in the manufacture of bolts and nuts and rivets, it seems like hitting a man when he is down. I do not think any manufacturer in the United States is getting, on the item of nuts and spikes and washers, at the present time, 1 per cent. above cost.

THE CHAIRMAN. These articles are used almost exclusively in the laying of rails?

MR. LORD. The spikes are used exclusively in the laying of rails. The nuts and the washers find their largest customers with the railroads.

Brief of Bar Iron Manufacturers

We appear before you in the interest of the owners and employees of 25 rolling mills, manufacturing iron bars in the territory east of the Allegheny Mountains, extending from Portland, Me., to Knoxville, Tenn., to protest against the reduction of the duty on iron and steel bars as proposed in House bill No. 18,642, now being considered by you.

The effect of the proposed tariff bill would be to place the burden of foreign competition directly upon Eastern manufacturers in the territory above described. The freight from said Eastern rolling mills to Atlantic coast points differs but little from the freight from Liverpool, Antwerp and Bremen to the same points; to some coast points the foreign freight would be less. Thus every vestige of protection would be taken from your petitioners, while the interior trade of the large steel corporations in the Middle West would be protected by their distance from the coast.

Why Bars Cost More Here than Abroad

The principal reason why bars cannot be produced as cheaply as in foreign competing countries is because labor is very much higher here than there. With the same labor cost here in the manufacture of iron bars, as in Belgium and Germany, we would not fear their competition. At the present time Belgian steel bars are offered at 1.65 cents duty paid, to Pacific coast points. This price is equivalent to 90 cents per 100 lb. at Pittsburgh—a price which has not been reached by the large steel corporations even under present depressed conditions.

The tariff on bar iron under the Dingley act was \$13.44 per gross ton. The Payne act reduced this to \$6.72. The proposed bill makes it 10 per cent. ad valorem, which, at the present time, we estimate would be \$2. If the proposed bill is intended to increase the revenue by the importation of bars, it may add a few hundred thousand dollars to the Federal revenue by destroying the value of many millions of dollars' worth of property represented by your petitioners.

Object to Ad Valorem Feature and to Dumping

In addition to our protest against the destructive feature of the proposed reduction, we strongly object to the ad valorem method which has had no advocates among the secretaries of the Treasury since 1846. But our strongest protest is against any reduction on iron and steel bars so soon after the duty has been cut in half. Our Canadian neighbors have duties against our manufactured products which are prohibitive—but they admit scrap iron (which is the raw material for making iron bars) entirely free of duty. Thus the home market of their rolling mills is insured by this protection, and they would be in position to dump their surplus product into the United States at or below their cost. This dumping of the surplus on foreign markets is considered good business in competing countries for such portion of their product as cannot be sold at home.

MR. LORD. In the meeting which sent me here, the horseshoe manufacturers were also represented; but my concern does not make horseshoes. With your permission, I will now introduce Mr. Wheelwright of the Old Dominion Iron and Nail Works Company, Richmond, Va.

The Horseshoe Industry

Statement of Thomas S. Wheelwright, Representing the Old Dominion Iron & Nail Works Company, Richmond, Va.

MR. WHEELWRIGHT. Mr. Lord has already stated the case of the bar iron and steel manufacturers. Our product is largely made up of those items; but nothing has

been said so far in regard to the horseshoe end of it. As I understand, horseshoes are on the free list of the Underwood bill. We look with great apprehension to the competition we shall meet from Canada if that bill becomes a law. There are three large manufacturers of horseshoes in Canada, and I presume that if they ran full time they could supply double the quantity of horseshoes that would be consumed in Canada.

THE CHAIRMAN. Have you attempted to figure out how the elimination of this duty would affect the consumer? Would it perceptibly benefit him?

MR. WHEELWRIGHT. I do not see how it would, for this reason: Horseshoes are now selling in Canada and in the United States at about the same price. I have gotten some information from Montreal, and their prices on horseshoes are about the same as mine at Richmond at this time. The prices of labor and material in Canada are about the same. They now have a duty assessed of, I think, 30 per cent. on horseshoes going into Canada. What I apprehend in case this bill should become a law is that they would run their factories full time, and dump their surplus product on us. That would be a very serious matter.

SENATOR SMOOT. What is the price of horseshoes today?

MR. WHEELWRIGHT. Around \$3.50 a keg. There are a great many sizes and styles, but that is the average.

SENATOR SMOOT. Do you think the farmer would pay less for shoeing his horses all round if the duty were taken off horseshoes?

The Consumer Would Get No Benefit

MR. WHEELWRIGHT. I do not think he would. The average number of shoes in a keg is said to be 100, or probably a little more; and 3½ cents per horseshoe does not look to me like very much. I have a place in the country, and I pay \$1 for shoeing horses, and I always have paid \$1; and when horseshoes were sold at almost twice what they are selling at now I still paid \$1. It seems that the man who puts them on gets the difference. There is a very small manufacturer's profit on them at the prices at which they are sold.

SENATOR McCUMBER. What is the duty in the proposed bill?

MR. WHEELWRIGHT. The duty is nothing. They are on the free list. The case of horseshoes is much worse than that of bars, nuts, bolts, or anything else that we make.

THE CHAIRMAN. The present duty is three-fourths of one cent per pound. What is the weight of a horseshoe or a muleshoe?

MR. WHEELWRIGHT. The average would be about a pound.

THE CHAIRMAN. Then suppose the duty made the difference in the cost, which is an assumption pure and simple: It would make a difference of three-fourths of one cent on each horseshoe?

MR. WHEELWRIGHT. Yes.

THE CHAIRMAN. And the chief cost of the horseshoe comes with the putting of the shoe on the horse, and the blacksmith's charges, I suppose—the horseshoer's charges?

MR. WHEELWRIGHT. So far as the consumer is concerned.

SENATOR McCUMBER. You do not think the consumer would get the benefit of that three-fourths of one cent, do you?

MR. WHEELWRIGHT. I do not think he would get any of it at all.

SENATOR McCUMBER. I do not think he would care for it if he did get it.

MR. WHEELWRIGHT. I do not think he would know it one way or the other. As the consumer would not know it if horseshoes were selling at \$1.50, I do not believe the consumer would know the difference if this duty were removed.

THE CHAIRMAN. On the shoes for the whole horse it would make a difference of four cents.

MR. WHEELWRIGHT. The jobber, the retailer, and the blacksmith are all between us and the consumer; and he would never know the difference.

The Farmer Would Be Fooled

THE CHAIRMAN. So that while it sounds good to the farmer, he is only getting a shell?

MR. WHEELWRIGHT. He will never hear from it. He will never know it. I base that on the fact that horseshoes have sold at higher prices than they do now. Take the case 10 or 15 years ago; they probably sold then as much as 50 cents a keg higher than they do now.

SENATOR McCUMBER. You have not heard the farmer weeping any over the cost of the shoe, have you?

MR. WHEELWRIGHT. I certainly have not. The jobber gets them, and he sells them to the retailer, and then they are doled out to the blacksmith.

THE CHAIRMAN. You say \$1 a mule or a horse is the fixed charge in your country for putting on a set of shoes?

MR. WHEELWRIGHT. In the country it is \$1 and in town it is \$1.50.

SENATOR McCUMBER. That includes furnishing the shoes.

MR. WHEELWRIGHT. That includes the shoes and the nails and the price of putting them on.

THE CHAIRMAN. That price has prevailed for several years?

MR. WHEELWRIGHT. It has prevailed for 25 years to my knowledge.

THE CHAIRMAN. And during that time how much variation has occurred in the price of horseshoes?

MR. WHEELWRIGHT. There has not been a range of more than \$1 per keg one way or the other in all that time. It has been down as low as \$2.50 at one time, and that put all of us pretty nearly out of business. Then it has been up as high as \$3.75 or \$3.80. That is about the range in that period. Now, referring to this \$3.50, the price of a keg of horseshoes, from 50 to 60 per cent. is labor.

THE CHAIRMAN. When the horseshoes got down to that low figure that you mentioned, \$2.50, did it reduce the price for shoeing a horse?

MR. WHEELWRIGHT. Not at all. It never changed. That is a matter of history. It made a loss in the manufacture of them, but no difference to the consumer.

Effect of Making Horseshoes Free

THE CHAIRMAN. Would or would not putting horseshoes on the free list close up your concern; or what would be the result?

MR. WHEELWRIGHT. It just depends upon how aggressive Canada would be in using her privilege. If the Canadians used it to the full limit, they could fix us particularly on the Eastern coast, where they could hit us quickly.

THE CHAIRMAN. Assuming that Canada would start up at full time her mills which are now working half time, and put her articles on the seaboard, you would be undersold pretty seriously, would you not?

MR. WHEELWRIGHT. I think they could put the Tredgegar Company and ourselves out of the game in six months. The Tredgegar Company, at Richmond, is another manufacturer of horseshoes.

THE CHAIRMAN. You would certainly have to reduce wages.

MR. WHEELWRIGHT. I would not be able to reduce wages, and I would simply have to quit; that is about the size of it. The wages could not be reduced.

There is one thing in regard to bars that I think is worthy of thought by the committee. I have noticed in all of the legislative treatment of bar iron that iron and steel are considered just as one thing, just alike. There is an essential difference between iron and steel. When you make iron you can make it only in units of about 500 lb. by the puddling process. That is a very old process. It has been in vogue since the middle of the eighteenth century. It has some merits, or else it would not have lasted all this time. The point is that when you treat iron and steel as the same thing I do not think you are treating iron as well as it might be treated, because you can make 50 tons of steel at a time, and you can make only 500 lb. of iron at a time. The amount of labor entering into a ton of iron is vastly greater than the labor that enters into a ton of steel; and if I understand the spirit of this general argument it is that the treatment of articles in the tariff is largely measured by the labor that enters into the value of a ton of the finished product; and on that score iron should be treated on its merits and on the basis of the essential differences between it and steel.

SENATOR McCUMBER. Iron should have a heavier duty, do you think?

MR. WHEELWRIGHT. I think, inasmuch as a greater proportion of the value of a ton of iron is in labor, it should have more care legislatively than a ton of stuff that has less of the labor.

SENATOR SMOOT. Have you any knowledge as to how many men are employed in the manufacturing of iron in this country?

MR. WHEELWRIGHT. In the whole country, I could not say; but I think the Eastern and Southern end of it would represent at least 20,000 men. They are old industries, all of them.

SENATOR SMOOT. If this business were destroyed and given to another country, and your men were thrown out of employment, they would have to seek it in some other kind of business, would they not?

MR. WHEELWRIGHT. That would be the inevitable result.

SENATOR SMOOT. And if that were the result, of course it would displace other workmen in other industries, and make virtually an oversupply of labor in this country, would it not?

MR. WHEELWRIGHT. It certainly would. Furthermore, the capital that is invested in all our plants would be of negligible value.

The Builders' Hardware Industry

Statement of Isaac D. Russell, of the American Hardware Corporation

MR. RUSSELL. The American Hardware Corporation, New Britain, Conn., has an investment of upward of \$15,000,000 in the manufacture of wood and machine screws, stove and tire bolts, furniture, desk and cabinet locks, padlocks, trunk and suit-case locks, door locks and general builders' hardware. It employs 5100 hands and distributes annually about \$2,600,000 through its payrolls. Our industry represents but a modest percentage of the total amount invested in such operations throughout the country. All the company's product would be affected by the Underwood bill. We are concerned, first, with paragraph 38, covering wood screws. The duty proposed here is 25 per cent. ad valorem, against specific duties in the Payne-Aldrich bill which average about 55 per cent. The principal competition to be encountered would be that of the Germans. Their export prices are much below those of the English makers, and the latter may, therefore, be left out of consideration.

Germans Sell at American Cost Prices

We have not the German costs to compare with our own; and we can only present, therefore, the German export prices in contrast with our own factory costs of the same sizes of steel screws. On size A the German export price is 3.67 cents per gross; the American cost is 3.7 cents. On size C the German price is 5.1 cents and the American cost 4.8 cents. On size E the German price is 8.67 cents and the American cost 8.8 cents, and so forth.

It will be seen that the German export prices parallel in curious fashion the American manufacturing costs, and closely approach them. The American costs are factory costs, and carry no burden of selling expense. We have not the German costs of production, which the labors of the Tariff Board might in time afford us, and for which we believe revision of the wood screw schedule should wait. But the very fact that the German makers openly advertise screws for export at prices practically identical with the American costs justifies the apprehension that the Germans may be able to invade the American market, in spite of a 25 per cent. tariff, especially if they resort to their notorious practice of dumping. We contend, therefore, that the rate of duty should not be fixed at 25 per cent., or at any other rate, until full information is at hand as to the industry at home and abroad, in the light of which information alone the rate of duty should be determined.

SENATOR SMOOT. Is there very much chance of undervaluation in the exportation of screws from Germany to this country?

MR. RUSSELL. There certainly would be if the rate were made ad valorem instead of specific. We prefer very much a specific rate.

Stove and tire bolts are the next item in which we are interested. In the Underwood bill, under paragraph 21, the rate of duty is fixed at 15 per cent. In the Payne-Aldrich bill a specific duty was laid of 1 1/4 cents per pound, which makes an average ad valorem duty of 25 per cent. What has been said regarding the wood screw schedule applies with equal force to the stove and tire bolt schedule. The same apprehension prevails as to the possibility of the Germans dumping in this market.

Hardware Castings

We are also concerned in paragraph 23 of the Underwood bill—machined iron castings. The proposed duty is 10 per cent., against a specific duty of 1 cent a pound imposed in the Payne-Aldrich bill, equivalent to about 26 per cent. ad valorem. Under this paragraph it would be possible to send over from abroad cast iron lock cases, caps and working parts, finished up to the point of japauning and assembling. They could then readily be put together in a simple assembling shop, and we believe they could be offered on this market at about 15 per cent. above the English or German basis. Casting, drilling and machining entail nearly the entire labor cost upon the cheaper grades of locks. What is true of locks is equally true of door-checks and similar articles. Moreover, this paragraph opens the door to undervaluation, for the importations under it would be of partly finished goods and disassembled goods, which possess no established market value. No standard for checking the importers' valuations would, therefore, be available; and it seems to us this paragraph invites irregular practices.

Again, we would be affected by paragraph 66, the so-called blanket paragraph. The rate fixed in the Underwood bill would be 25 per cent. ad valorem against 45 per cent. ad valorem in the Payne-Aldrich bill. In two classes of hardware at the present time we are outclassed by English and French makers. These two classes are the very

highest priced French hardware, which is hand-chased, and in which labor plays much the larger part.

THE CHAIRMAN. Are there many importations of those articles?

MR. RUSSELL. They are all imported at the present time so far as I know.

SENATOR McCUMBER. Do you export many goods?

MR. RUSSELL. Our direct exports are but \$170,000 a year. In times past, when we opened our London warehouse, the English were using a wrought lock. We duplicated that lock in a cast-iron lock. As it was cheaper, we could undersell the English and we held that market. Just as soon as the English had imitated that lock and made it in cast iron we lost it; and so it has necessitated our selling only specialties over there. In Canada we sell about \$35,000 worth of one certain class of goods, and that class of goods is not made in Canada. It is for the most part the very highest class, bronze goods and articles that require expensive investment to manufacture.

SENATOR SMOOT. What is your annual production?

MR. RUSSELL. About \$7,000,000.

THE CHAIRMAN. Has there been a large margin of profit in your business?

MR. RUSSELL. There has been a good margin, but not an exorbitant margin. Our investment is upward of \$15,000,000 and our profits last year were a trifle over \$1,000,000.

Further Price Comparisons

THE CHAIRMAN. Have you anything further to state to the committee?

MR. RUSSELL. I will present a few comparisons here of the selling price of French, English and German hardware with the American cost of the same articles. Taking the French high-class chased hardware, a certain form of escutcheon is sold by the French at \$3.28. Our cost to produce it would be \$8.94. In the case of certain bolts, the French selling price is \$12.71, and our cost would be \$46.94. We do not produce them at all. In the case of English hardware, a chain door fast sells for 60 cents, and our cost is \$1.08. An English knob is \$2.58 and our cost \$3.07. In the case of German hardware, a trunk lock there sells for \$2.26, and the cost here is \$2.45. In another case the figures are \$1.53 and \$2.17. In the case of a trunk corner the figures are 49 and 57 cents.

British Makers Are Low Sellers in Canada

The experience of Canadian hardware makers in their competition with English manufacturers affords a valuable analogy to what might occur upon our side of the line were the proposed reduction of duty to 25 per cent. ad valorem put into effect. Under the British preferential tariff, locks and hardware of English make are assessed a duty of 20 per cent. ad valorem, I believe. In spite of this 20 per cent. tax English hardware reproducing American models is largely imported into Canada at this time, and is freely offered at prices much below those asked by either Canadian or American firms. Canadian manufacturers agree that their hardest competition is that of English manufacturers, who offer to duplicate and do duplicate goods of their manufacture at prices that preclude anything approximating a reasonable profit.

I present here a few articles in which our prices, f.o.b. New Britain, include no duty, while the English price is f.o.b. Toronto, with a duty of 20 per cent. full paid. In the case of a certain form of knob, the American price is \$8.30; the English price is \$5.92. In the case of a certain other knob, the American price is 90 cents and the English price 80 cents. In the case of a certain type of lock, the figures are \$4.50 and \$3.63; in another, \$9 and \$5.43. Canadian manufacturers maintain that the importation of English-made hardware into the Canadian market has but just begun; and they argue that the established duty of 20 per cent. is insufficient to allow them to compete with the English on a footing of equality if the present Canadian standard of wages is to be maintained. The Canadian situation, in our belief, gives rise to a question as to whether the 25 per cent. duty would be sufficient to protect American hardware manufacturers.

American and British Wages

We give a comparison between average hourly rates of wages in various occupations as found in our own plants and wages in the same trades in England. The English scale is published in the "Standard Time Rates of Wages in the United Kingdom October 1, 1910," a British Government publication: Iron molders, American, 25 cents an hour; English, 15.4 cents; iron molders' helpers, 16 and 10 cents respectively; grinders, 22 and 14 cents; brass molders, 27.5 and 15.5 cents; helpers, 17.5 and 10 cents; common labor, 15 and 11 cents.

The average hourly rate of wages in our Russell & Erwin plant, which produces locks, latches, keys and other builders' hardware, is 20 cents for day workers and 19 cents

for piece workers. Foremen and department heads are not included. The average hourly rate in England for those engaged in the manufacture of locks, latches, keys, etc., is 8.3 cents. This startling difference is in part accounted for by the general employment of apprentices, women, boys and girls, by English lockmakers in occupations followed by men alone in this country. The report of the British Board of Trade for 1906 covers the wage conditions of 696 persons engaged in the making of locks and latches. Of this number 336, or 49 per cent., were apprentices, women, boys and girls, whose full weekly wages range from \$2.50 down to \$1.52. Out of our 1270 operatives only 268, or 21.1 per cent., were of the class above mentioned.

SENATOR SIMMONS. In England the apprentice receives very little compensation; part of his reward is in the opportunity to learn the trade. There is no such system as that in this country, as I understand.

MR. RUSSELL. We have some few apprentices in the trades who get from 50 to 75 cents a day while they are learning. We have 14 apprentices, I think, in our works now, in this one particular works.

SENATOR McCUMBER. Do you know whether or not they pay living wages to apprentices in Great Britain in that line of work?

MR. RUSSELL. I do not. There is one other point regarding the labor situation, and that is that even what has been cited does not measure the full difference; for it is well known in the hardware trade that there is a certain custom prevalent in England of farming out work. Under that system, work is taken out of the factories and done at home, the entire family cooperating in the work, and producing it under a piece work plan at labor rates which may be materially lower than those that have been quoted.

THE CHAIRMAN. How many separate concerns are engaged in this business in the United States?

MR. RUSSELL. I should think there were fifty concerns that make hardware of one kind or another; probably more.

SENATOR SIMMONS. You make 20 per cent., you say?

MR. RUSSELL. Perhaps so.

SENATOR SIMMONS. Are you the largest single establishment, practically speaking?

MR. RUSSELL. I should think the Yale & Towne Mfg. Company perhaps is the largest. I think putting 20 per cent. for our output is putting it too high, because there is the Yale & Towne Mfg. Company, Sargent & Company of New Haven, the Reading Hardware Company of Reading and the Penn Hardware Company of Reading. Those are the main manufacturers. There are a number of small ones besides.

SENATOR SIMMONS. What percentage of foreign labor is employed in this industry?

MR. RUSSELL. I do not know. It has been increasing of late years. Among the foremen and heads of departments you will find the Irish of the first or second generation—Irish and Germans. The machinists you will find are largely Swedes. When you go down to the rough labor you find they are largely Poles.

SENATOR SIMMONS. Is the standard of living of the common unskilled Pole laborer employed in these factories a very high standard?

MR. RUSSELL. It very soon becomes high. When he first comes over it is low; but it takes a very short time for him to develop. When they first entered New Britain a few years ago—we did not employ them at that time—they were willing to work for 90 cents a day. Today those same men can earn in our plating room \$2 or \$2.25 a day.

SENATOR SIMMONS. What is the standard of living of the Pole you employ when he first comes over?

MR. RUSSELL. They generally live in tenements, a large number in one-room tenements. The family takes boarders. When they first come over here it is their ambition to acquire land, and great numbers of the Poles in our town have acquired real estate and have quite considerable bank balances.

SENATOR SIMMONS. Is it not a matter of fact that these cheap laborers from Europe, these newly arrived immigrants in the factories, are crowding out the American and the Northern and Western European laborers whom you formerly employed in the factories?

MR. RUSSELL. I could not say they are crowding them out, because the Americans, the North Europeans, the second generation Irish and Swedish and the Germans care very little for factory work. They would prefer to go into shop keeping and into clerking, and into the professions.

SENATOR SIMMONS. Have they not been crowded out by these recent immigrants?

MR. RUSSELL. Not crowded out; they voluntarily gave up these occupations.

SENATOR SIMMONS. I am not speaking of skilled laborers, but common laborers in the factories; have they not been crowded out, as common laborers in the fac-

tories, and are not the factories employing these recent arrivals, and employing them because they work for less wages than the Americans, and are they not able to work at less wages than the American because they live more cheaply than the ordinary American?

MR. RUSSELL. No, I would not admit that they were crowding them out, because the rates of wages paid in those occupations are higher today than they have been.

SENATOR SIMMONS. As a matter of fact, you do employ these immigrants who are coming to this country. They do not get the same wages as the Americans formerly got?

MR. RUSSELL. They are getting the same, quite the same; quite as much or higher wages. The tendency of wages has been up.

SENATOR SMOOT. They are getting more than the Americans got a few years ago, are they not?

MR. RUSSELL. Yes.

SENATOR SIMMONS. What per cent. of your unskilled laborers are native Americans?

MR. RUSSELL. Very, very few.

SENATOR SMOOT. What per cent. of your employees are skilled labor and what unskilled?

MR. RUSSELL. I should think 50 per cent. were skilled.

SENATOR GALLINGER. You get very few Americans now to do the work of unskilled laborers, do you not?

MR. RUSSELL. We get none at all. I do not know of a native American doing unskilled labor in our plant.

Adverse Report by Senate Finance Committee

It was given out at the close of the tariff hearings of the Senate Finance Committee last week that the Underwood iron and steel tariff bill would be reported to the Senate this week with an adverse recommendation. The report will give the majority's reasons for not offering a substitute bill, the chief of these being that the metal industries have not yet been reported on by the tariff board. Commenting on the work of the committee Senator Penrose, the chairman, said, on March 6:

Hearings on the metal tariff bill closed to-day after the finance committee had heard witnesses for nearly five weeks. Not the least interesting feature of these hearings was the appearance of representatives of workmen and officers of the labor organizations in the various branches of the metal industry. The universal testimony of these men was that wages in the metal industry of America are from 25 to 100 per cent higher than in England, Germany, France and Belgium. The evidence also disclosed the fact that many of the metal industries of England and Germany employ a much larger proportion of women and children than in this country, and that the system known as "cottage labor" largely prevails in foreign countries. This latter is work done by men, women and children at home. It was also brought out that the standard of living and the comforts of the workmen are much inferior abroad than here and that the hours of labor are considerably longer. In addition to these workmen who appeared, the committee is in receipt of a great number of petitions signed by employees protesting against the passage of the bill. If the metal bill passed by the Democratic House of Representatives should become a law, two results will follow, according to all the testimony. Wages will be reduced and production curtailed, or else establishments will be closed altogether and their employees thrown upon the general labor market to bring down still further the rate of wages.

With the close of the hearings many petitions came from workmen asking for the defeat of the bill. These included the following: Three hundred employees of the Follansbee Brothers Company, Follansbee, W. Va.; 150 employees of the McCullough Iron Company, Wilmington, Del.; 200 employees of the Parkersburg Iron & Steel Company of Parkersburg, W. Va.; 175 employees of the Berger Mfg. Company and 275 employees of the Stark Rolling Mill Company, Canton, Ohio; 415 employees of the West Penn Steel Company, Brackenridge, Pa.; 400 employees of the Youngstown Iron & Steel Company, Youngstown, Ohio; 220 employees of the N. & G. Taylor Company, Cumberland, Md.; 175 members of the Chain-Makers' Union and Amalgamated Association, Columbus, Ohio.

The usual annual meeting of sales managers of the Republic Iron & Steel Company was held in Youngstown, Ohio, last week, representatives being present from New York, Cleveland, Chicago, St. Louis, Philadelphia, Cincinnati and other cities. J. A. Topping, chairman, and T. J. Bray, president, were present. Daily sessions were held in the Republic Building at Youngstown. On Friday evening, March 8, the company tendered its sales managers a dinner at the Youngstown Club.

An Important German Tube Combination

BERLIN, February 29, 1912.—The Mannesmann Röhrenwerke (tube works), Düsseldorf, Germany, is putting through two important deals which promise to give it a position of easy supremacy in the German steel tube industry. It is announced that the company has made an arrangement with the Wittener Stahlröhrenwerke to take over the sale of the latter's products for 30 years under a plan of profit-sharing. It is also announced that the Mannesmann concern will raise its capital, now 30,000,000 marks, by issuing 12,000,000 marks new stock, as well as by securing a loan of 10,000,000 marks. This additional money is needed for rebuilding and enlarging the company's works in Germany, Austria, and Italy. Both the companies above named operate in the main on specialties controlled by patents, and under the new arrangement each will continue to make its own specialties.

Before the news of the above transaction had grown cold there came the additional announcement that the Mannesmann company had made a similar arrangement with Balcke, Telling & Co., of Benrath, another steel tube mill. This arrangement also extends for 30 years. One of the significant points in these transactions is that the Balcke establishment is owned largely by the Rheinische Stahlwerke, one of the big mixed concerns of the lower Rhine region. In other words, the three tube mills have an assured supply of steel for their use, while the Rheinische company secures large and steady customers for its products.

These transactions are to be regarded as having a direct bearing upon the preparations for prolonging the Steel Works Union. It means—as various similar community-of-interest arrangements made within the past few years meant—that the big steel works are providing themselves with steady customers, so that they can well afford to stand alone if the Union cannot be prolonged. Such transactions also immensely strengthen the moral position of a steel company in the fight for big allotments.

Crestline Mfg. Company's Improvements

The Crestline Mfg. Company, maker of pumps for spraying purposes, Crestline, Ohio, is making important improvements in its plant as follows: Extension to machine shop, 40 x 60 ft., building to be of brick and iron, fireproof, with cast casements for windows. Enlargement in the assembling department, 40 x 40 ft., so as to give a special department for erecting sprayers only. Enlargement of the shipping room, about 40 x 60 ft., to take care of the increasing business at that end of the plant. New office, modern in every respect; main office and manager's private office to be on the first floor; drafting room, file room and storage of office supplies to be placed above. This company will come on the market in 1912 with several new power sprayer outfits for which it is having a heavy demand. The new management of this company is taking special pains to see that its products go on the market always in a first-class condition. Its efforts in less than a year have shown that the trade appreciates its method of manufacture.

The Cincinnati Motors Company is a new organization composed of Franklin Alter, president American Tool Works Company; J. B. Doan, vice-president and general manager of the same company, and Harry T. Alter. The new company has acquired the plant, patterns and fixtures of the Power Car Company, at Central Avenue and York Street, Cincinnati, Ohio, and will soon engage in the manufacture of automobiles and auto trucks. It is understood that the present factory will be remodeled and enlarged.

Edgar Allen & Co., Ltd., Allen's high-grade tool steel, have established their Eastern offices and warehouses at 86 John street, New York, where they carry a complete stock to enable them to meet promptly the requirements of customers. All their Eastern agencies have been terminated.

No. 2 blast furnace of the La Belle Iron Works, Steubenville, Ohio, has been blown in on basic iron. The two stacks of this company are now making close to 800 tons of basic iron per day.

THE IRON AGE

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A Quantitative Analysis of the Tariff

There has been almost altogether lacking, in analyses of the results of the Payne tariff, a comparison of results in the light of the general activity of the iron and steel trade. Inasmuch as the Payne tariff became effective August 6, 1909, it has been customary to take for comparison the fiscal year ended June 30, 1909, as representing the last year of operation of the Dingley tariff, and the fiscal year ending June 30, 1910, as the first year of operation of the Payne tariff. To this there have been added more recently the results of the fiscal year ended June 30, 1911, constituting practically the second year of the operation of the Payne tariff.

To get the true quantitative results, the two tariffs should not be studied by themselves, however, but in the light of the activity of the industry. Under the continuous operation of a single tariff the imports rise and fall in close accordance with business conditions. It could occur (and in fact it did occur) that a change in the tariff would be practically contemporaneous with a change in general business conditions, which would affect our commerce quite irrespective of the tariff. The Payne tariff became effective August 6, 1909, just at a time when the iron and steel industry was rapidly passing to a plane of much greater activity. No better gauge of this activity can be found than the production of pig iron, and we show this herewith for the three fiscal years, in gross tons:

Pig Iron Production.

Year ended June 30,	Gross tons.
1909	20,040,360
1910	29,751,863
1911	23,990,625

Here we see an increase of 48 per cent. in pig iron production from what was practically the last year of the Dingley tariff to what was practically the first year of the Payne tariff, and then we see from that year to the next a decrease of 19 per cent. in production. It is perfectly plain that such great changes in business conditions as are thus expressed could not fail to be accompanied by great changes in imports, totally apart from any change that might be due to new rates of duty. It is therefore entirely misleading to make comparisons of imports, and of duties collected, without throwing upon the figures the light of this information.

The actual movement in imports is shown in a table below. It comprises all iron and steel imports, from scrap and pig iron through machinery, cutlery, firearms, etc., but not including firearms. As will be discussed later, a considerable portion of these imports was for re-export purpose, with benefit of drawback.

Iron and Steel Imports, Values, Fiscal Years.

	Imports.	Duties.
1909 Free	\$573,742	
Dutiable	21,182,388	\$8,174,055
Total	21,756,130	
1910 Free	1,901,242	
Dutiable	37,553,398	12,375,286
Total	39,454,640	
1911 Free	2,333,594	
Dutiable	32,119,753	10,160,992
Total	\$34,453,347	

The increase in imports from 1909 to 1910 was very striking, being almost a doubling, while the amount of duty collected increased by one-half. The next year, however, both the imports and the amount of duty col-

lected decreased. The Payne tariff was still in force. Having observed the great changes in the iron and steel producing and consuming activity of the country, we are moved at once to study the above figures in the light of these changes. The simplest method is to compute the value of imports, and the amount of duty collected, per ton of pig iron produced in this country. This computation gives the following results:

Value of Imports, per ton of Pig Iron Produced.

1909	\$1.17
1910	1.36
1911	1.44

Duty Collected, per ton of Pig Iron Produced.

1909	\$0.407
1910	0.415
1911	0.423

It is seen at once that the Payne tariff, operative practically in 1910 and 1911, did not raise materially more revenue, in proportion to the business activity, than did the Dingley tariff in its last year. The average of 1910 and 1911 is 41.8 cents, against 40.7 cents in 1909, when the Dingley tariff was in operation. The increase, 2.7 per cent., is negligible. It would be hair-splitting to attempt to base an argument upon it.

Comparing the value of imports, we see a material increase. The average of 1910-11 was \$1.40, against \$1.17 in 1909, an increase of 20 per cent. Thus the Payne tariff allowed about 20 per cent. more imports to come in, but raised practically no more duty. It is possible that to a limited extent imports were held back, prior to July 1, 1909, in anticipation of the passage of a bill with reduced rates. If so, the actual operation was less impressive even than the figures indicate.

The duties collected, computed ad valorem upon the dutiable imports, were as follows in the three years, the figures showing the percentage the duties constituted of the declared values:

	Per cent.
1909	38.59
1910	32.95
1911	31.63

In the fiscal year 1910, when the total iron and steel duties collected amounted to \$12,375,286, drawbacks were paid on iron and steel amounting to \$2,100,935, illustrating the fact that even of the very moderate duties collected on iron and steel the Government does not retain all. It would, therefore, seem impossible for the Government to win any large revenue from iron and steel imports, unless these imports were made to reach very large proportions, and this of course would be very damaging to our domestic industry. Under the Payne law the iron and steel imports have been painfully perceptible to our industry, especially on the Pacific coast, even though the net revenue to the Government has been almost negligible.

It seems plain that the framers of the Underwood bill intend to increase the importations of iron and steel, and hence the revenues from that source, by lowered schedules of duties. This was brought out strikingly in the statement made by W. U. Follansbee, of the Follansbee Brothers Company, manufacturer of tin plate, before the Senate Finance Committee. Mr. Follansbee quoted from the report of the sub-committee which presented the Underwood schedules the statement that the tin plate duty of 20 per cent. fixed by the pending bill will result in an estimated revenue of \$1,000,000, whereas the value of all tin plates imported in 1911 was \$1,082,000, on which the duty was \$378,972. The collection of \$1,000,000 in revenue would

necessitate the importation of 78,125 net tons of tin plate, or nearly 10 per cent. of the domestic production in the year 1911.

It is impossible to reconcile such contemplated results as the above with the statement reiterated by Chairman Underwood that he has no intention of bringing about a condition that will do harm to any domestic industry. The story of the figures is self-interpreting.

Unskilled American Mechanics

The agitation over the proposed placing of machine tools on the free list has called pointed attention to the scarcity and increasing cost of skilled labor in American machine shops, and also to the use of unskilled machine shop labor to better advantage in Germany than in this country. Until a very few years ago it had been the boast of Americans that their shops were able to produce machinery on a parity with European works, despite the very much lower wages paid abroad, because in workmanship and design this country far outpointed foreign competition. It appears now that in Germany works organization is as good as ours, taking the average, and that the labor is as efficient per man, as well as very much cheaper, and consequently the Germans are able to produce machine tools as good as many concerns manufacture on this side of the water at not much above half the cost.

That the supply of American mechanics is altogether too small is an old story. The apprentice system was permitted to die out and the relative supply of skilled men fell away rapidly. In the last ten years a more or less organized effort has been made to increase the number and has met with considerable success. Nevertheless the demand for this class of labor has increased so greatly that each year the proportion of trained men to the total number of mechanics which must be employed has become smaller.

The consequence has been that vast numbers of men have been trained for specialized work in machine shops, and improved machinery has made it possible to decrease the average excellence of workmen without reducing the quality of the product. When it is taken into account that this class of labor has received so much attention, on so great a scale, it is astonishing if another nation has passed us in the science of utilizing untrained or partly trained mechanics. Whatever Americans may do, machinery will be built more cheaply abroad than in this country, because the difference in wages of men of similar ability is pronounced. On the other hand, considering the great start American shops have had on their foreign competitors in methods of manufacturing, the degree of difference in cost should be less. A vast discrepancy exists between different works as to efficiency in machine tool building. Some shops get a much greater volume of product per dollar expended than do others. The better the organization in American shops the less the handicap given European builders.

A lesson from the tariff agitation should be the further modernizing of shops to the highest possible point. The threat that American builders may have to fight foreign competitors in the American market should be a sufficient incentive. Even should tariff conditions remain unchanged, the American machine tool builder should utilize every opportunity to give himself an advantage in competition with European tools in foreign markets.

High-Grade Tools and High-Grade Men

Supplementing the editorial in *The Iron Age* of February 29 to the effect that good machine tools attract good workmen to a plant, an actual experience may be related. This would seem to indicate that beyond the fact that good machines attract good men are two others, namely, that good machines are necessary for the production of accurate and high-grade work, and that the best men are drawn to the shops by the work of higher character.

A large manufacturing company in Ohio doing a general foundry and machinery business had for many years made a specialty of sugar machinery. A large portion of the machine work involved was simple and required no unusual accuracy; for example, the facing and drilling of flanges for cast-iron pipe work. The company had proceeded with its old equipment through a number of years of this kind of work, and, due to the general knowledge of the character of work it was doing and the equipment with which it was operating, the shop came to have a reputation as a place for mediocre mechanics only.

On one occasion the company was the successful bidder for ten Crozier disappearing gun carriages to be built for the Government. The accuracy and nicety of the work on this job required the installing of a number of new machines. Within a surprisingly short time the company had opportunity to hire more highly skilled mechanics than it had occasion to use. Upon the completion of this contract, with no more similar work in sight, most of the men left. The machines, of course, remained. A few years later the former situation was repeated when the same company took a contract to build a large triple expansion vertical pumping engine plant for municipal installation. This work was likewise of a much better character than the ordinary run of the shop, and again a better class of men took employment, only to leave again when the pump contract was completed.

It is natural that the company having high-grade work to do will equip its plant with high-grade tools, and the two things work together in attracting skilled labor. At the same time it is true that two companies manufacturing similar lines of goods will be able to retain in their employ mechanics whose average ability will correspond with the character of their respective equipments.

The Senatorial School of Economics

Some of the economic vagaries that have cropped out in the tariff hearings before the Senate Finance Committee are past fathoming. As illustration, we take this from the examination of a steel manufacturer:

SENATOR: If your business should become so unprofitable, because of tariff legislation or from any other cause, that you had to make it up by an advance in your selling price, you would be helpless as against the United States Steel Corporation, would you not?

MANUFACTURER: The United States Steel Corporation can produce more cheaply than the rest of us.

SENATOR: Not only that, but they might practically prevent you from advancing the price of your product for the purpose of enabling you better to compete with the imports?

Making an advance in prices when business is unprofitable because of competition from abroad would be pleasant for the manufacturer, no doubt, but will the Senator be good enough to indicate how the wicked foreign competitor will be held in leash meantime?

He might also elucidate more fully the procedure (of which our manufacturers thus far have been, perhaps, far too ignorant) when prices are advanced so that the manufacturer may "better compete with imports!"

Correspondence

The Magnet in Heat Treatment of Steel

To the Editor:—In *The Iron Age* of January 18, 1912, I note with interest the communication of J. E. Washburn, of Cleveland, relative to the "Magnetic Properties of Heat Treated Steel." If those who are interested will refer to my paper on the "Heat Treatment of Steel," printed in *The Iron Age* of November 23, 1911, they will see the statement that that article deals only with forging steels. The carbon limit of forging steel is generally conceded to be about 1 per cent. By forging steel is meant that steel which is used in the parts of machines and made by the open hearth or Bessemer process. It is generally understood that springs are about as high in carbon as any steel required for this purpose. I specifically stated that I would not consider tool steel.

Mr. Washburn is entirely right in saying that the magnet may be used for determining the hardening or annealing temperature of steel of a higher carbon than 0.90 per cent. It is used in many plants in connection with the treating of tools and with steels up to and including 1.50 per cent. carbon. At times when the tools are large, a portable dipping needle is used, similar to the one described by Mr. Washburn, while at other times the piece is removed from the furnace and the effect noted upon a stationary dipping needle. This depends upon the convenience to the operator.

Relative to the safety of quenching in different mediums, I would say that it is quite customary to quench tools in water or brine if extreme hardness is desired. Referring again to the scope of my article, it is not advisable to quench the ordinary forging steel in water or brine, unless it is a regular piece and extra hardness is required. Oil quenching is preferable. Tools made of a very high grade of steel can be handled differently; in many cases water or brine is used exclusively. Drop forging dies are an example of a steel of over 0.50 per cent. carbon which are invariably quenched entirely in water. The matter of quenching is largely one of judgment and one hardener will have complete success in quenching in water while another will have repeated failures.

Mr. Washburn's suggestion to first plunge in brine to effect a superficial hardness and then finish quenching in oil is excellent, and could be applied in many cases with satisfactory results.

JAMES H. HERRON.

CLEVELAND, OHIO, March 9, 1912.

Proposed Accelerated Corrosion Test

To the Editor: I read with great interest the comment of William R. Fleming, appearing in the issue of February 29, on my paper entitled "A Proposed Accelerated Corrosion Test." Since I wrote this article I have talked with Carl Sundstrom, experimentalist of the Solvay Process Company, Delray, Mich., who stated that he had used an ordinary bell jar for the same purpose, with the idea of noting the action of various corroding gases on cast iron, steel and different kinds of rubber.

In view of the unsatisfactory results obtained by Mr. Fleming, it would appear that no idea of the life of steel or iron, when subjected to corrosion, can be secured in the laboratory; therefore it would seem to me that more elaborate field tests should be made, such as subjecting the different kinds of iron and steel to the action of the atmospheres in boiler plants, under bridges, in round houses, etc., and the results tabulated in order that it may be possible to tell with some certainty the best kind of material to use for a given situation.

I have in mind a galvanized sheet boiler housing placed on the roof over an installation of two Wickes upright boilers. This material was subject to the action of the air outside contaminated by the smoke of passing locomotives.

tives, of the air inside contaminated by the gases from the boiler furnace and heating furnaces close by and also exposed to the steam formed on wetting down the ashes drawn from the various fires. After this roofing material had been exposed for about a year and a half it was as friable as so much tissue paper and would fall apart of its own weight.

WILLIAM D. MAINWARING.

DETROIT, MICH.

Power Requirements for Rolling Mills

To the Editor: In the writer's communication printed in your issue of February 22 two typographical errors occur. The last two paragraphs in the first column of page 470 should read as follows:

"Some examples of this can be mentioned. At the ninth revolution, 1200 hp. is being given to the fly-wheel; the i. h. p. of the cylinders, the only source of power, shows only 800 hp. Where does the power come from to supply this difference of 400 hp., plus the friction mill load of 300 hp., which we must have at that point, instead of the negative 700 hp. as plotted? A similar condition is shown between each pass, the discrepancy increasing in the later passes.

"If the passes are marked on the power curve sheet, it will be noticed that approximately as much work is shown by mill load curves between, as during, passes, which is manifestly impossible."

CHAS. FITZGERALD, JR.

PITTSBURGH, PA.

The National Machine Tool Builders

James H. Herron Made Permanent Secretary—The Atlantic City Convention

James H. Herron, Cleveland, Ohio, has been elected permanent secretary of the National Machine Tool Builders' Association. Mr. Herron is a metallurgist by profession and was formerly with Motch & Merriweather, Cleveland.

The spring convention of the association will be held at Atlantic City probably the week beginning May 12. The present plan is to occupy the last half of the week with the three days which will be given up to the meetings.

Lake Superior Iron Ore Shipments in 1911

The usual compilation of iron ore shipments by mines from the Lake Superior region has been made for 1911 by the Iron Trade Review. The shipments by water, which have already been given in these columns, were 32,130,411 gross tons. We estimated the all-rail shipments around 600,000 tons. They prove to have been 662,719 tons, making the total of 1911 shipments, 32,793,130 tons. The following table shows the shipments by ranges for 1911 and the preceding four years:

	1911.	1910.	1909.	1908.	1907.
Marquette	2,833,116	4,392,726	4,256,172	2,414,632	4,388,073
Mnominiee	3,911,174	4,237,738	4,875,385	2,679,156	4,964,728
Gogebic	2,603,318	4,315,314	4,088,057	2,699,856	3,637,102
Vermillion	1,088,930	1,203,177	1,108,215	841,544	1,685,267
Mesaba	22,093,532	29,201,760	28,176,281	17,257,350	27,495,708
Cuyuna	147,431	.....	.....	.....	.....
Miscellaneous	115,629	91,682	82,759	122,449	95,790
Totals	32,793,130	43,442,397	42,586,869	26,014,987	42,266,668

The pre-eminence of the Mesaba range is even more striking than heretofore, its percentage for 1911 being 67.37 as against 67.22, the highest previously, in 1910. The Steel Corporation's shipments from the Hill properties last year were 5,499,759 tons, leaving 3,417,862 tons yet to be made up on the total of its minima under the Hill contract, up to January 1, 1912. The Steel Corporation's percentage of the total shipped last year from all ranges was 52.7, against 49.86 in 1910, 50.36 in 1909, 56 in 1908 and 1907 and 53 in 1906.

Eight-Hour Shifts at Lake Superior Iron Mines

A change has been made in the hours of miners employed in the underground mines of the Oliver Iron Mining Company, the Steel Corporation's Lake Superior subsidiary. It applies to upward of 6000 men employed by

this company on the various Lake Superior ranges and it is understood will become operative at the underground iron mines of other companies. The new arrangement means that miners will hereafter work eight hours a day in place. It applies to no other class of employees than those doing actual mining work. These men work on the contract system and are paid on a tonnage basis. There is no change in the rate of pay and the miner to make the same wages as heretofore must do the same amount of work in eight hours as in nine hours or 9¼ hours in place under the old system. Counting out the time taken in entering and leaving the mine, under the 10-hour system, and considering, as claimed by many of the miners, that the last hour of the shift has not been an effective one, it is expected that the output under the new system will equal that heretofore made. In the mines to which the eight-hour plan will apply two shifts are being worked.

The Taylor Iron & Steel Company

At the annual meeting of the stockholders of the Taylor Iron & Steel Company, held at High Bridge, N. J., March 5, the annual report showed that the earnings for the year 1911 were satisfactory, although there had been a falling off in business as compared with 1910. Besides the regular 7 per cent. dividend on the preferred stock, 6 per cent. on the common stock is being paid and, in addition thereto, the surplus and reserve accounts have been increased. The company reports its plant and equipment, through recent extensions and additions, in excellent condition to handle a largely increased business. The following directors were elected: Henry M. Howe, Knox Taylor, L. H. Taylor, Jr., E. H. Earnshaw, H. J. Cochran, Edgar S. Cook, A. E. Borie, V. G. Simkhovitch and James Imbrie. They elected the following officers: Knox Taylor, president; A. E. Borie and Henry M. Howe, vice-presidents, and W. A. Ingram, secretary and treasurer.

The German Steel Syndicate

Our Berlin correspondent states that the fate of the Steel Works Union still hangs in uncertainty. It is now reported that an unofficial agreement has been reached among some of the older companies to the effect that only the new establishments are to be given increased allotments in A products, and that all other applications for increased allotments must be distributed among B products. It is proposed to make a prolongation for five years in much the same forms as now existing. It is further reported that active negotiations for the renewal will not be taken up until after April 1, when it is proposed to rush the renewal through as rapidly as possible. According to the latest information the outlook for the renewal has improved.

The Foundrymen's Convention at Buffalo, September 23

It has been decided to hold the annual convention of the American Foundrymen's Association at Buffalo, September 23 to 27. As recently stated in these columns, difficulties arose due to the impossibility of completing the 74th Regiment Armory in time to hold the meeting in June. Agreement on the above September dates has been made between the officers of the American Foundrymen's Association, the American Brass Founders' Association and the Foundry & Machinery Exhibition Company. The rebuilding of the armory, which furnished the only hall suitable for the exhibits of the foundry, machinery and supply firms, will be completed in the coming summer and no difficulty will be found in arranging the display by the dates which have just been fixed. The arrangement is satisfactory to all the organizations involved and is expected to insure a very large attendance. Secretary Moldenke of the American Foundrymen's Association and Secretary Corse of the American Brass Founders' Association have a goodly number of papers promised and the sessions for discussions will be made of special interest.

The Dominion Steel Corporation's output for February was as follows: Coke, 41,454 tons; pig iron, 25,345 tons; ingots, 27,205 tons; blooms, 22,620 tons; rails, 17,180 tons, and rods, 5,225 tons.

The Iron and Metal Markets

Heavy Pig Iron Buying

Higher Prices for Bessemer and Basic

A Better Feeling in All Markets—A Feverish Condition in Coal and Coke

Pig iron buying by steel companies has been a stimulus to the market in all lines and there has been an added effect from its coincidence with the coming of spring. It need hardly be said, however, that the feeling in the trade is still far from buoyant; there are too many reminders of the low state of profits in every department of the industry.

The Steel Corporation's purchases of Bessemer pig iron thus far in the Central West amount to 20,000 tons, on which the price was \$13.75 to \$14. Of melting steel scrap it bought 20,000 tons in the Pittsburgh and Chicago districts. No basic iron was bought and indications now are that any further purchases will be of Bessemer iron.

A Youngstown steel company closed for 80,000 tons of Bessemer pig iron, on which deliveries extend over six months—50,000 tons being on an ore deal and 30,000 tons an outright purchase. Another Youngstown steel company bought 10,000 tons of Bessemer iron at \$14 at furnace. Furnaces are now asking \$14.25 for Bessemer iron and \$13 for basic. Recent buying by Pittsburgh district steel companies has taken up the basic iron, about 50,000 tons, long carried at Midland, Pa., a part of it being owned by a speculative buyer. A considerable inroad has been made also on the stocks of Bessemer iron in the Mahoning Valley. Total purchases in the past two weeks, including the 80,000 tons mentioned above, amount to nearly 150,000 tons of Bessemer and 75,000 tons of basic.

The Algoma Steel Company is in the market for 20,000 tons each of Bessemer and basic iron, but little of this can be supplied by Valley furnaces.

Foundry iron markets have felt an impetus from the activity in steel-making iron. At Pittsburgh the Westinghouse interests have closed for 12,000 tons of foundry grades for the second half of the year. At Buffalo and in the East inquiry for foundry iron has increased, four important interests which buy at New York having asked for upwards of 25,000 tons.

The chances of anthracite and bituminous coal strikes have figured more largely in the iron market this week. There is little evidence of precautionary buying of iron and steel, but the efforts of blast furnaces, steel works and foundries to accumulate coal and coke have created feverish conditions in those markets with no great success so far in adding to present stocks of fuel. Sentiment is divided as to the prospects of a strike, but the trade has not acted as though in real fear of a fuel shortage. Yet prices of steam coal have nearly doubled in the past two weeks and prompt furnace coke has gone to \$2.35, but with the price entirely a matter of agreement between buyer and seller.

The British coal strike, our cablegram states, has

practically stopped pig iron production in Great Britain, and stocks of Cleveland iron are being rapidly reduced. European consumers may call for Alabama iron in view of the tying up of vessels in England.

The Central Western market for billets and sheet bars has been active, and a number of independent sheet and tin plate companies have bought sheet bars for the second and third quarters on the basis of \$20 to \$20.50 Pittsburgh. It is reported from England that an American independent steel company has made sales of 15,000 tons of billets and sheet bars there and that further business would have been put through but for the coal strike.

Railroad buying is still restricted. Chicago reports 15,000 tons of bridge work about to be closed for various roads, and track supplies are active, with an advance of \$1 a ton in spikes. The Wabash has bought 20,000 tons of open hearth rails, and 24,000 tons in smaller lots were taken by various roads in the past week.

There is a stronger effort by the mills to get 1.15c. Pittsburgh for plates and structural shapes and 1.10c. for steel bars, but there are still evidences that some independent steel companies are not as well reinforced by tonnage to stand for these prices as the leading interest.

An interesting export order has been taken by the Phoenix Bridge Works—a bridge over the Jumla River, India, requiring 4000 tons of steel.

The wrought pipe trade reports increasing inquiry for oil and gas lines. An advance of \$4 a ton has been made on galvanized iron pipe.

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics.

At date, one week, one month and one year previous.

Pig Iron,	Per Gross Ton:	Mar. 13,	Mar. 6,	Feb. 14,	Mar. 15,
		1912.	1912.	1912.	1911.
Foundry No. 2 standard, Philadelphia		\$14.85	\$14.85	\$14.85	\$15.50
Foundry No. 2, Valley furnace		13.00	13.00	13.00	13.75
Foundry No. 2, Southern, Cincinnati		13.50	13.50	13.25	14.25
Foundry No. 2, Birmingham, Ala.		10.25	10.25	10.00	11.00
Foundry No. 2, at furnace, Chicago*		14.00	14.00	14.00	15.50
Basic, delivered, eastern Pa....		14.25	14.25	14.25	15.25
Basic, Valley furnace.....		12.85	12.40	12.25	13.75
Bessemer, Pittsburgh.....		15.15	14.90	14.90	15.90
Malleable Bessemer, Chicago...		14.00	14.00	14.00	15.50
Gray forge, Pittsburgh.....		13.40	13.40	13.40	14.40
Lake Superior charcoal, Chicago		15.75	15.75	16.00	17.50
Billets, etc., Per Gross Ton:					
Bessemer billets, Pittsburgh....		19.50	20.00	20.00	23.00
Open hearth billets, Pittsburgh		19.00	19.50	20.00	23.00
Forging billets, Pittsburgh....		26.50	26.50	28.00	28.00
Open hearth billets, Philadelphia		22.40	22.40	22.40	25.40
Wire rods, Pittsburgh.....		25.00	25.00	25.00	29.00
Old Material, Per Gross Ton:					
Iron rails, Chicago.....		15.00	15.00	15.00	15.50
Iron rails, Philadelphia.....		15.50	15.50	16.00	18.50
Car wheels, Chicago.....		13.00	13.00	13.00	13.25
Car wheels, Philadelphia.....		11.75	11.75	12.00	14.00
Heavy steel scrap, Pittsburgh...		12.75	12.00	12.25	14.25
Heavy steel scrap, Chicago....		10.75	10.50	10.50	12.00
Heavy steel scrap, Philadelphia..		11.75	11.50	11.75	14.00

*The average switching charge for delivery to foundries in the Chicago district is 50c. per ton.

Finished Iron and Steel,	Mar. 13, 1912.	Mar. 6, 1912.	Feb. 14, 1912.	Mar. 15, 1911.
Per Pound to Largest Buyers:	Cents.	Cents.	Cents.	Cents.
Bessemer rails, heavy, at mill...	1.25	1.25	1.25	1.25
Iron bars, Philadelphia.....	1.22½	1.25	1.27½	1.37½
Iron bars, Pittsburgh.....	1.25	1.15	1.25	1.35
Iron bars, Chicago.....	1.15	1.15	1.15	1.40
Steel bars, Pittsburgh.....	1.10	1.10	1.15	1.40
Steel bars, tidewater, New York	1.26	1.26	1.31	1.56
Steel bars, Pittsburgh.....	1.10	1.10	1.12½	1.40
Tank plates, tidewater, New York	1.26	1.26	1.28½	1.56
Beams, Pittsburgh.....	1.15	1.15	1.12½	1.40
Beams, tidewater, New York....	1.31	1.31	1.28½	1.56
Angles, Pittsburgh.....	1.15	1.15	1.12½	1.40
Angles, tidewater, New York....	1.31	1.31	1.28½	1.56
Skelp, grooved steel, Pittsburgh.	1.10	1.10	1.12½	1.30
Skelp, sheared steel, Pittsburgh.	1.15	1.15	1.20	1.35

Sheets, Nails and Wire,

Per Pound to Largest Buyers:				
Sheets, black, No. 28, Pittsburgh	1.80	1.80	1.85	2.20
Wire nails, Pittsburgh.....	1.60	1.60	1.60	1.80
Cut nails, Pittsburgh.....	1.55	1.55	1.55	1.60
Fence wire, ann'led, 0 to 9, P'gh.	1.40	1.40	1.40	1.55
Barb wire, galv., Pittsburgh....	1.90	1.90	1.90	2.10

Coke, Connellsville,

Per Net Ton, at Oven:				
Furnace coke, prompt shipment.	\$2.15	\$1.85	\$1.80	\$1.55
Furnace coke, future delivery..	2.15	1.85	1.80	1.75
Foundry coke, prompt shipment.	2.50	2.25	2.10	2.00
Foundry coke, future delivery...	2.50	2.25	2.20	2.25

Metals,	Per Pound:	Cents.	Cents.	Cents.	Cents.
Lake copper, New York.....	14.62½	14.62½	14.37½	12.50	
Electrolytic copper, New York.	14.50	14.50	14.25	12.25	
Spelter, St. Louis.....	7.00	6.82½	6.55	5.50	
Spelter, New York.....	7.15	6.97½	6.70	5.65	
Lead, St. Louis.....	3.92½	3.92½	3.97½	4.22½	
Lead, New York.....	4.00	4.00	4.00	4.37½	
Tin, New York.....	42.25	43.25	44.00	39.75	
Antimony, Hallett, New York.	7.37½	7.37½	7.50	9.25	
Tin plate, 100-lb. box, New York	\$3.54	\$3.54	\$3.64	\$3.94	

Prices of Finished Iron and Steel f.o.b. Pittsburgh

Freight rates from Pittsburgh in carloads, per 100 lb., New York, 16c.; Philadelphia, 15c.; Boston, 18c.; Buffalo, 11c.; Cleveland, 10c.; Cincinnati, 15c.; Indianapolis, 17c.; Chicago, 18c.; St. Paul, 32c.; St. Louis, 22½c.; New Orleans, 30c.; Birmingham, Ala., 45c.; Pacific Coast, 80c. on plates, structural shapes and sheets No. 11 and heavier; 85c. on sheets Nos. 12 to 16; 95c. on sheets No. 16 and lighter, 65c. on wrought pipe and boiler tubes.

Plates.—Tank plates, ¼ in. thick, 6¼ in. up to 100 in. wide, 1.10c., base, net cash, 30 days. Following are stipulations prescribed by manufacturers, with extras:

Rectangular plates, tank steel or conforming to manufacturers' standard specifications for structural steel dated February 6, 1903, or equivalent, ¼ in. and over on thinnest edge, 100 in. wide and under, down to but not including 6 in. wide, are base.

Plates up to 72 in. wide, inclusive, ordered 10.2 lb. per square foot, are considered ¼-in. plates. Plates over 72 in. wide must be ordered ¼ in. thick on edge, or not less than 11 lb. per square foot, to take base price. Plates over 72 in. wide ordered less than 11 lb. per square foot down to the weight of 3-16 in take the price of 3-16 in.

Allowable overweight, whether plates are ordered to gauge or weight, to be governed by the standard specifications of the Association of American Steel Manufacturers.

Extras,	Cents per lb.
Gauges under ¼ in. to and including 3-16 in. on thinnest edge	.10
Gauges under 3-16 in. to and including No. 8	.15
Gauges under No. 8 to and including No. 9	.25
Gauges under No. 9 to and including No. 10	.30
Gauges under No. 10 to and including No. 12	.40
Sketches (including all straight taper plates) 3 ft. and over in length	.10
Complete circles, 3 ft. in diameter and over	.20
Boiler and flange steel	.10
"A. B. M. A." and ordinary firebox steel	.20
Still bottom steel	.30
Marine steel	.40
Locomotive firebox steel	.50
Widths over 100 in. up to 110 in., inclusive	.05
Widths over 110 in. up to 115 in., inclusive	.10
Widths over 115 in. up to 120 in., inclusive	.15
Widths over 120 in. up to 125 in., inclusive	.25
Widths over 125 in. up to 130 in., inclusive	.50
Widths over 130 in.	1.00
Cutting to lengths or diameters under 3 ft. to 2 ft., inclusive	.25
Cutting to lengths or diameters under 2 ft. to 1 ft., inclusive	.50
Cutting to lengths or diameters under 1 ft.	1.55
No charge for cutting rectangular plates to lengths 3 ft. and over.	

Wire Rods and Wire.—Bessemer, open hearth and chain rods, \$25. Fence wire, Nos. 0 to 9, per 100 lb., terms 60 days, or 2 per cent. discount in 10 days, carload lots, to jobbers, annealed, \$1.40; galvanized, \$1.70. Carload lots to retailers, annealed, \$1.50; galvanized, \$1.80. Galvanized barb wire to jobbers, \$1.90; painted, \$1.60. Wire nails, to jobbers, \$1.60.

The following table gives the prices to retail merchants on wire in less than carloads, including the extras on Nos. 10 to 16, which are added to the base price:

Fence Wire, Per 100 Lb.	Nos.	0 to 9	10	11	12 & 12½	13	14	15	16
Annealed	...	\$1.55	\$1.60	\$1.65	\$1.70	\$1.80	\$1.90	\$2.00	\$2.10
Galvanized	...	1.85	1.90	1.95	2.00	2.10	2.20	2.60	2.70

Structural Material.—I-beams, 3 to 15 in.; channels, 3 to 15 in., and angles, 3 to 6 in., on one or both legs, ¼ in. and over, 1.15c. Other shapes and sizes are quoted as follows:

	Cents per lb.
I-beams over 15 in.	1.20 to 1.25
H-beams over 18 in.	1.20 to 1.25
Angles over 6 in.	1.20 to 1.25
Angles, 3 in. on one or both legs, less than ¼ in. thick, plus full extras, as per steel bar card Sept. 1, 1909.	1.20 to 1.25
Tees, 3 in. and up.	1.20 to 1.25
Zees, 3 in. and up.	1.15 to 1.20
Angles, channels and tees, under 3 in., plus full extras as per steel bar card Sept. 1, 1909.	1.20 to 1.25
Deck beams and bulb angles.	1.45 to 1.50
Hand rail tees	2.00 to 2.15
Checkered and corrugated plates.	2.00 to 2.15

Sheets.—Makers' prices for mill shipments on sheets of U. S. Standard gauge, in carload and larger lots, on which jobbers charge the usual advances for small lots from store, are as follows:

Blue Annealed Sheets.	Cents per lb.
Nos. 3 to 8	1.20 to 1.25
Nos. 9 and 10	1.30 to 1.35
Nos. 11 and 12	1.35 to 1.40
Nos. 13 and 14	1.40 to 1.45
Nos. 15 and 16	1.50 to 1.55

Box Annealed Sheets, Cold Rolled.	One Pass.	Three Pass.
Nos. 10 to 12	1.45 to 1.50	
Nos. 13 and 14	1.50 to 1.55	
Nos. 15 and 16	1.55 to 1.60	1.65 to 1.70
Nos. 17 to 21	1.60 to 1.65	1.70 to 1.75
Nos. 22, 23 and 24	1.65 to 1.70	1.75 to 1.80
Nos. 25 and 26	1.70 to 1.75	1.80 to 1.85
No. 27	1.75 to 1.80	1.85 to 1.90
No. 28	1.80 to 1.85	1.90 to 1.95
No. 29	1.85 to 1.90	1.95 to 2.00
No. 30	1.95 to 2.00	2.05 to 2.10

Galvanized Sheets of Black Sheet Gauge.	
Nos. 10 and 11	1.80 to 1.85
Nos. 12, 13 and 14	1.90 to 1.95
Nos. 15, 16 and 17	2.05 to 2.10
Nos. 18 to 22	2.20 to 2.25
Nos. 23 and 24	2.30 to 2.35
Nos. 25 and 26	2.50 to 2.55
No. 27	2.65 to 2.70
No. 28	2.80 to 2.85
No. 29	2.90 to 2.95
No. 30	3.10 to 3.15

All above rates on sheets are f.o.b. Pittsburgh, terms 30 days net, or 2 per cent. cash discount in 10 days from date of invoice, as also are the following base prices per square for painted and galvanized roofing sheets, with 2½-in. corrugations.

Corrugated Roofing Sheets Per Square.	Gauge.	Painted.	Galvanized.	Gauge.	Painted.	Galvanized.
29	\$2.20		23	.....	\$3.35
28	1.30	2.45	22	.....	3.50
27	1.40	2.50	21	.....	3.85
26	1.50	2.55	20	.....	4.15
25	1.70	2.90	18	.....	5.40
24	1.95	3.00	16	.....	6.25

Wrought Pipe.—The following are the jobbers' carload discounts on the Pittsburgh basing card on wrought pipe, in effect from December 1, 1911:

Butt Weld.				
	Steel		Iron	
	Black.	Galv.	Black.	Galv.
¼ and ¾ in.....	74	54	68	49
¾ in.....	75	65	69	53
1 in.....	78	68	72	59
¾ to 1½ in.....	81	72	75	64
2 to 3 in.....	82	75	76	65
Lap Weld.				
1½ and 1½ in.....	79	..	68	61
2 in.....	79	72	72	63
2½ to 4 in.....	81	74	74	66
4½ to 6 in.....	80	72	73	65
7 to 12 in.....	78	68	71	61
13 to 15 in.....	55	..	47	..
Butt Weld, extra strong, plain ends, card weight.				
¼, ¾, ¾ in.....	70	60	63	55
¾ in.....	75	69	70	63
¾ to 1½ in.....	79	73	74	65
2 to 3 in.....	80	74	75	66
Lap Weld, extra strong, plain ends, card weight.				
1½ in.....	..	..	66	60
2 in.....	76	70	71	63
2½ to 4 in.....	78	72	73	66
4½ to 6 in.....	77	71	72	65
7 to 8 in.....	70	60	63	55
9 to 12 in.....	65	55	60	50

Butt Weld, double extra strong, plain ends, card weight.

1/2 in.	65	59	60	52
3/4 to 1 1/2 in.	68	62	63	55
2 to 3 in.	70	64	65	57

Lap Weld, double extra strong, plain ends, card weight.

2 in.	66	60	61	52
2 1/4 to 4 in.	68	62	63	57
4 1/2 to 6 in.	67	61	62	56
7 to 8 in.	60	50	55	45

Plugged and Reamed.

1 to 1 1/2, 2 to 3 in. Butt Weld	Will be sold at two (2) points lower basing (higher price) than merchants' or card weight pipe. Butt or lap weld as specified.
2, 2 1/2 to 4 in. Lap Weld	

The above discounts are for "card weight," subject to the usual variation of 5 per cent. Prices for less than carloads are three (3) points lower basing (higher price) than the above discounts.

Boiler Tubes.—Discounts on lap welded steel and standard charcoal iron boiler tubes to jobbers in carloads are as follows:

Steel.	Standard Charcoal Iron.
1 1/4 to 2 1/4 in.	1 1/2 in.
2 1/2 in.	1 1/4 to 2 1/4 in.
2 3/4 to 3 1/2 in.	2 1/2 in.
3 1/2 to 4 in.	2 3/4 to 5 in.
5 to 6 in.	Locomotive and steamship
7 to 13 in.	special grades bring higher prices.

2 1/2 in. and smaller, over 18 ft., 10 per cent, net extra.

2 3/4 in. and larger, over 22 ft., 10 per cent, net extra.

Less than carloads will be sold at the delivered discounts for carloads, lowered by two points for lengths 22 ft. and under to destinations east of the Mississippi River; lengths over 22 ft. and all shipments going west of the Mississippi River must be sold f. o. b. mill at Pittsburgh basing discount, lowered by two points.

Pittsburgh

PITTSBURGH, PA., March 13, 1912.—(By Telephone.)

Pig Iron.—A complete reversal in conditions has taken place, and in one week the market has changed from extreme quietness to unusual activity. The total purchases of Bessemer iron figure up close to 150,000 tons. The market on Bessemer iron to-day is firm at \$14.25 at Valley furnace. The sales of basic iron foot up to 75,000 tons or more. In addition to buyers named in the report by mail, all the steel casting concerns in the Pittsburgh district have been buyers of iron. The Algoma Steel Company, Sault St. Marie, has inquiries out for 20,000 tons of basic and 20,000 tons of Bessemer. The United Steel Company, Canton, Ohio, has inquiries out for 3000 tons of basic for April delivery, but is expected to buy a considerably larger quantity. The Westinghouse Electric & Mfg. Company, Pittsburgh, has bought 10,000 to 12,000 tons of foundry iron for last half of the year delivery. Foundries are taking in iron very promptly and in most cases are anticipating shipments. We have advanced prices on Bessemer and basic iron. One furnace is reported to be asking \$13.50 at furnace for basic. We note a sale of 3000 tons of basic for April, May and June delivery at \$12.85. We quote: Bessemer iron, \$14.25; basic, \$12.85 to \$13.; malleable Bessemer, \$13; No. 2 foundry, \$13 to \$13.25, and gray forge, \$12.50, all at Valley furnace, the freight rate to the Pittsburgh district being 90c. a ton.

Steel Billets.—Heavy contracts for sheet and tin bars have been placed with Pittsburgh and Youngstown steel makers for delivery in second and third quarters. Although shipments are heavy, in some cases sheet and tin plate mills are not getting bars as fast as they are needed. We quote f.o.b. Pittsburgh: Bessemer billets, 4 x 4 in., 0.25 carbon at \$19.50 to \$20; open-hearth billets, \$19 to \$19.50; Bessemer and open-hearth sheet and tin plate bars, \$20 to \$21, and forging billets, \$28. We quote f.o.b. Youngstown mill: Bessemer and open-hearth billets, \$19 to \$19.50; Bessemer and open-hearth sheet bars, \$20 to \$20.50.

Coke.—Prompt 72-hr. coke is reported to have sold this morning at \$3, and prompt furnace coke at \$2.35 net ton at oven. There is a heavy demand for all the coke that can be found.

(By Mail.)

The purchase of 100,000 tons or more of Bessemer pig iron and 30,000 to 40,000 tons of basic by several leading steel companies, the prospective strike of coal miners April 1 and the purchase of 15,000 to 20,000 tons of heavy steel scrap by constituent companies of the Steel Corporation have made the local market more active than for a long time. The Carnegie Steel Company has bought 10,000 tons of Bessemer iron from Valley furnaces and 5000 tons from W. P. Snyder & Co. at the reported price of \$14 at furnace. The Youngstown Sheet & Tube Company, which early in

February made a deal with the Ohio Iron & Steel Company for the melting of about 50,000 tons of ore into Bessemer iron, last week made a purchase of 30,000 tons of Bessemer at less than \$14 at furnace, and also made another deal with the Ohio Iron & Steel Company by which the latter will furnish 50,000 tons of Bessemer iron, the ore to be supplied by the Youngstown Company. This makes a total of 105,000 tons of Bessemer iron which the Youngstown Company has bought outright and made conversion deals for so far this year. As it is melting about 15,000 tons per month more than it makes, the purchase was imperative. The Republic Iron & Steel Company has also bought 10,000 tons of Bessemer iron from Valley furnaces at the reported price of \$14 at furnace. All these different lots of iron were for prompt delivery. It is stated that practically all of the 40,000 to 50,000 tons of basic pig iron which has been piled for months in the furnace yards of the Midland Steel Company at Midland, Pa., has been sold. This iron was owned by the Fownes interests, George Flinn and the Midland Steel Company, and is understood to have been bought by the Jones & Laughlin Steel Company, the Pittsburgh Steel Company and several other local consumers. Other lots of basic iron have been sold, including one of 5000 tons, at \$12.60, Valley furnace, made to a local steel company. Pig iron has been the weak spot in the situation, but with the developments of the past week the market is stronger, and higher prices are predicted for all kinds of pig iron.

Ferromanganese.—Inquiries are in the market from a local consumer for 200 tons for delivery over four months commencing April, and \$41, Baltimore, is the lowest price quoted on this inquiry. Several dealers having small lots are offering carloads at about 25c. a ton under the regular price. We quote English 80 per cent. at \$41, Baltimore. The freight rate to the Pittsburgh district is \$1.95 a ton.

Ferrosilicon.—Sales have been made of three or four cars, amounting to 75 to 100 tons, for prompt delivery, at \$70 for 50 per cent. The market is firm. We quote 50 per cent. in lots up to 100 tons at \$70; over 100 tons to 600 tons, \$69, and over 600 tons, \$68, Pittsburgh. The lower grades are ruling at about \$20 for 10 per cent.; \$21 for 11 per cent.; \$22 for 12 per cent., f.o.b. cars at furnace, Ashland, Ky., or Jackson, Ohio.

Muck Bar.—The market is quiet, with prices on standard grades of muck bar made from all pig iron firm at \$28, delivered at buyer's mill, Pittsburgh.

Wire Rods.—New inquiry is mostly for small lots. We quote Bessemer, open-hearth and chain rods at \$25, Pittsburgh.

Skelp.—A local plate mill is reported to have bought 2000 tons of narrow grooved plates, April and May delivery, on the basis of about 1.12 1/2 c., delivered. The inquiry is slightly better, and the tone of the market is stronger. We quote grooved steel skelp at 1.10c. to 1.12 1/2 c.; sheared steel skelp, 1.15c. to 1.20c.; grooved iron skelp, 1.40c. to 1.45c. and sheared iron skelp, 1.55c. to 1.60c., all for delivery at buyer's mill in the Pittsburgh district.

Steel Rails.—The Chesapeake & Ohio Railroad has closed for about 20,000 tons of standard sections, of which about 15,000 tons was taken by the Carnegie Steel Company, which has also recently booked some large orders for both standard section and light rails for export. In the past week the Carnegie Company received new orders and specifications against contracts for about 3500 tons. We quote splice bars at 1.50c. per lb., and repeat quotations on rails: Standard sections, 1.25c. per lb.; 8 and 10-lb. light rails, 1.25c.; 12 and 14-lb., 1.16c.; 16, 20 and 25-lb., 1.12c.; 30 and 35-lb., 1.10c., and 40 and 45-lb., 1.08c., f.o.b. at mill.

Structural Material.—The Jones & Laughlin Steel Company has taken orders aggregating 700 to 800 tons; the Mount Vernon Bridge Company, 500 tons for a bridge for the Baltimore & Ohio Railroad at Chicago; the American Bridge Company, 700 to 800 tons for a new machine shop and foundry building for H. K. Porter & Co., of this city, and the McClintic-Marshall Construction Company, about 1200 tons for a new foundry building for the Washington Navy Yard. The contract for the new bank and office building of the East End Savings & Trust Company, which will take about 6000 tons, will not be given out for some time. The market on plain material is firmer and we quote beams and channels up to 15 in. at 1.15c., f.o.b. Pittsburgh.

Plates.—The Jones & Laughlin Steel Company has taken 2200 tons of plates for new caissons for the Panama Canal. The Western Maryland Railroad, whose new line between Cumberland, Md., and Connelville, Pa., will be opened shortly, has placed contracts for 25 locomotives, of which 15 are of the con-

solidation type, to be built by the American Locomotive Company, and 10 of the Pacific type, to be built by the Baldwin Locomotive Works. An Eastern structural steel company is inquiring for 5000 tons of plates, while the Standard Oil Company is figuring on the building of a new oil refinery which will take 10,000 tons. The Pressed Steel Car Company received an order from the Northern Pacific Railroad for 50 tank cars. We continue to quote $\frac{1}{4}$ -in. and heavier plates at 1.10c. to 1.15c., f.o.b. maker's mill.

Sheets.—Specifications for black and galvanized sheets continue fully as heavy as in February. New inquiry for roofing sheets is reported considerably better. As yet prices on sheets have shown no advance, No. 28 black ruling at 1.80c. to 1.85c. and No. 28 galvanized at 2.80c. to 2.85c. at maker's mill, but the lower prices are named only on desirable contracts. Several of the leading mills report that they are operating practically full.

Tin Plate.—Considerable more business for re-export has been placed by the Standard Oil Company, the tonnage being divided between the leading interest and one or two of the outside mills. Specifications against contracts are coming in at a very heavy rate, but the mills are hampered in shipments by the shortage in supply of box cars, which seems to be getting worse. A considerable number of important mills are running close to full capacity. We quote 14 x 20 coke plates at \$3.25 up to \$3.40 per base box, prices depending on size of the order.

Iron and Steel Bars.—An improvement in specifications in steel bars is noted and shipments by the mills are heavier. An increase in the demand for steel bars for concrete reinforcing has set in and promises to be quite heavy. We quote steel bars at 1.10c. on the usual run of orders and common iron bars at 1.25c. at mill, but on very desirable specifications and in certain sections 1.05c. on steel bars can be done.

Hoops and Bands.—Several makers report that the demand for both hoops and bands is showing improvement. The open market on bands is 1.10c., with extras as per the steel bar card, and hoops 1.25c., but for desirable business these prices continue to be shaded by one or two makers about \$1 a ton.

Rivets.—Both boiler and structural rivets are in considerably better demand. More new business is being placed than for some time. Specifications against contracts for boiler rivets from the railroads are showing a heavy increase and there is also some liberal specifying for structural rivets. We continue to quote structural rivets at 1.45c. to 1.50c. and boiler rivets at 1.55c. to 1.60c., prices depending on the size of the order and deliveries wanted by the customer.

Shafting.—Several nice orders have lately been placed by large consumers. The automobile builders are taking in more shafting than for some time. In spite of the better demand and more liberal specifications against contracts, prices do not show any betterment. We quote cold-rolled shafting at 67 per cent. off in carload and larger lots and 62 per cent. in small lots, delivered in base territory.

Railroad Spikes.—Some new orders are being placed, and railroads are specifying more liberally against contracts. We quote base sizes of railroad spikes at \$1.35 per 100 lb. in carload and larger lots, while small lots are sold at \$1.40 per 100 lb.

Spelter.—Spelter is scarce for prompt shipment and prices promise to advance still more. We quote prime grades of Western at 6.85c., East St. Louis, equal to 6.97 $\frac{1}{2}$ c., Pittsburgh. The consumption of spelter at present is much heavier than for a long time.

Wire Products.—The demand for wire and wire nails is becoming more active. Specifications against contracts are heavier than at any period in the last three or four months. Shipments of wire products are being hampered by the scarcity of box cars. It is stated that regular prices are being fairly well maintained. We quote wire nails at \$1.60; cut nails, \$1.55; galvanized barb wire, \$1.90; painted, \$1.60; annealed fence wire, \$1.40, and galvanized fence wire, \$1.70, f.o.b. Pittsburgh, usual terms, freight added to point of delivery.

Merchant Pipe.—The Ohio Fuel Supply Company of this city is expected to close this week for 75 miles of 12-in. pipe and the Philadelphia Company, also of this city, is expected shortly to buy 50 to 65 miles of 10 to 16 in. steel pipe. The demand for merchant pipe continues fairly heavy, two local mills reporting that orders booked so far this month are in excess of the same period in February. The leading pipe mills are operating at 80 to 90 per cent. of capacity. No change

in prices of black or galvanized steel pipe are expected to be made in the near future, as all of the leading pipe mills have sent out notices to their customers agreeing to take orders for pipe for delivery up to July 1 at present discounts.

Boiler Tubes.—The Wabash Railroad has recently placed a large order for locomotive tubes, the business being divided among local mills. Specifications against contracts for both locomotive and merchant tubes are heavier.

Iron and Steel Scrap.—The Carnegie Steel Company and other constituent interests of the Steel Corporation have bought 15,000 to 20,000 tons of heavy steel scrap and the market is much stronger. The Carnegie company has bought for delivery at Munhall and Sharon and is reported to have paid \$13 per gross ton, delivered. Dealers are now quoting as follows, per gross ton, f.o.b. Pittsburgh, unless otherwise noted:

Heavy steel scrap, Steubenville, Follansbee, Brackenridge, Sharon, Monessen and Pittsburgh delivery	\$12.75 to \$13.00
No. 1 foundry cast	12.25 to 12.50
No. 2 foundry cast	10.25 to 10.50
Bundled sheet scrap, f.o.b. consumers' mill, Pittsburgh district	11.00 to 11.25
Rerolling rails, Newark and Cambridge, Ohio, Cumberland, Md. and Franklin, Pa. ..	12.75 to 13.00
No. 1 railroad malleable stock	11.25 to 11.50
Grate bars	9.00 to 9.25
Low phosphorus melting stock	15.00 to 15.25
Iron car axles	20.50 to 21.00
Steel car axles	16.00 to 16.25
Locomotive axle	22.00 to 22.50
No. 1 busheling scrap	11.00 to 11.25
No. 2 busheling scrap	7.00 to 7.25
Old car wheels	12.00 to 12.25
*Cast iron borings	9.00 to 9.25
*Machine shop turnings	9.50 to 9.75
†Sheet bar crop ends	13.75 to 14.00
Old iron rails	14.50 to 14.75
No. 1 wrought scrap	12.50 to 12.75
Heavy steel axle turnings	9.75 to 10.00
Stove plate	9.00 to 9.25

*These prices are f.o.b. cars at consumers' mills in the Pittsburgh district.

†Shipping point.

Coke.—The prospective strike on April 1 of the coal miners has brought about a heavy demand for furnace coke for prompt shipment. Large tonnages have been sold at prices ranging from \$1.85 to \$2.15 at oven. A local steel company is picking up all the outside coke it can find. The Jones & Laughlin Steel Company, which will soon be operating three blast furnaces at Aliquippa, is now consuming about 25,000 tons of coke per month, and when the fourth furnace goes on, which will be in about two weeks, it will be using 40,000 to 50,000 tons. We quote standard makes of prompt furnace coke at \$2.15 to \$2.25 per net ton at oven. Prompt foundry coke is also higher and it has sold up to \$2.50 per net ton at oven.

The Neville Iron Company has been organized to engage in the iron and steel scrap trade, and has established yards on Neville Island, where it has direct connections with the Pittsburgh & Lake Erie and Pittsburgh, Fort Wayne & Chicago railroads. General offices have been opened in rooms 811-812 Curry Building, Pittsburgh. J. H. Aaron is president; James M. Clark, secretary and treasurer; C. M. McKenney, general manager. The yard will be equipped with electric cranes, lifting magnets, shears, etc.

M. A. Hanna & Co., whose main offices are at Cleveland, Ohio, will discontinue their Pittsburgh offices in the Oliver Building after April 1. In the future all business in the Pittsburgh district will be handled by traveling salesmen, reporting to the Cleveland office. This firm controls the output of 10 merchant blast furnaces, of which eight are in blast, and is also a large operator in Lake Superior ore and in coal and coke.

Chicago

CHICAGO, ILL., March 13, 1912. (By Telegraph.)

In finished steel lines the movement toward better prices seems definitely under way. The tendency toward a firmer attitude is especially satisfactory by being free from any artificial stimulus and appears to have developed with the gathering momentum that the steadily maintained tonnage of specifications has acquired. An Eastern plate mill not in the Pittsburgh district has advanced its price to the basis of 1.20c., Pittsburgh, and with one or two exceptions mill quotations in this district are hardening perceptibly on the basis of 1.15c. The market has been impressed by the recent purchases of raw material by the large steel making interests, and this evidence of heavy operations

in the finishing departments is confirmed by the decidedly extended deliveries to which customers are compelled to submit. Rail orders, particularly open hearth, have been much heavier in the last few weeks. There has been a good demand for rolling billets from mills whose open-hearth capacity has failed to meet the demands of the finishing department. There has been a general broadening of demand both for plates and structural shapes, and of the latter in the neighborhood of 15,000 tons has been purchased for railroad bridges. The car shortage is a distinctly troublesome factor in connection with shipments, and one interest reports that it is 2000 box cars behind in its requirements. Melters of scrap, although having made heavy purchases, are short of melting stock due to the embargo that weather conditions have placed upon the influx of old material. The local scrap market has responded to this condition with a showing of firmness, particularly for prompt shipment.

Pig Iron.—While there continues a scattering inquiry for iron in small lots to be delivered in the remainder of the first quarter, most of the melters in this territory are apparently covered for that period. It is probable that on such prompt shipments as are being made, \$10.25, Birmingham, can be done, but the more general price is \$10.50. There is a fairly active inquiry for third quarter delivery, and it is probable that a fair amount of business could be placed for that delivery at going prices. Northern iron is moving somewhat more freely than Southern iron but in conjunction with a decidedly unsatisfactory price situation. We quote for Chicago delivery, except for local irons, which are f.o.b. furnace, the following prices on prompt shipments:

Lake Superior charcoal.....	\$15.75 to \$16.50
Northern coke foundry, No. 1.....	14.50
Northern coke foundry, No. 2.....	14.00
Northern coke foundry, No. 3.....	13.50 to 14.00
Northern Scotch, No. 1.....	16.00
Southern coke, No. 1 foundry and No. 1 soft.....	15.35
Southern coke, No. 2 foundry and No. 2 soft.....	14.85
Southern coke, No. 3.....	14.35
Southern coke, No. 4.....	14.10
Southern gray forge.....	13.85
Southern mottled.....	13.85
Malleable Bessemer.....	14.00
Standard Bessemer.....	16.75
Basic.....	14.75
Jackson County and Kentucky silvery, 6 per cent.....	16.40
Jackson County and Kentucky silvery, 8 per cent.....	17.40
Jackson County and Kentucky silvery, 10 per cent.....	18.40

(By Mail.)

Rails and Track Supplies.—In addition to the rail negotiations mentioned as pending a week ago, the Illinois Steel Company is understood to be rolling 20,000 tons for the Wabash Railroad. While little publicity has been given to recent specifications for rails, evidence supports the prevailing impression that the aggregate tonnage placed with local mills in the past few weeks is a decided improvement as compared with the long continued period of inactivity which previously existed. We quote standard railroad spikes at 1.50c., base; track bolts, with square nuts, 1.90c., base, all in carload lots, Chicago; standard section Bessemer rails, 1.28c.; open hearth, 1.34c.; light rails, 40 to 45 lb., 1.16c. to 1.20c.; 30 to 35 lb., 1.19½c. to 1.24c.; 16, 20 and 25 lb., 1.20½c. to 1.25c.; 12 lb., 1.25c. to 1.30½c.; angle bars, 1.50c., Chicago.

Structural Material.—Specifications for structural material which for some weeks were confined almost entirely to car builders' requirements, have now broadened notably to include a very fair proportion of tonnage for architectural purposes and bridge building. Local fabricators are now anticipating in preparation for the several office buildings to be erected in this city the coming spring and summer. Western railroads, including the Great Northern, the Chicago & Northwestern, the Rock Island, the Burlington and the Wabash systems, have placed or have under consideration the purchase of 12,000 to 15,000 tons of bridge steel. The J. I. Case Threshing Machine Company, Racine, Wis., will begin the erection of plant extensions requiring about 4000 tons as soon as the weather permits. Several small orders for 200 and 300 tons for factory and warehouse buildings have been taken by local fabricating shops. The Modern Steel Structural Company, Waukesha, Wis., will furnish 147 tons for a factory for Charles Stein, Hammond, Ind. Contracts were let for 591 tons for lock gates for the Keokuk dam and 107 tons by the Geo. A. Fuller Construction Company at Kansas City. Deliveries of structural shapes from local mills continue to be long drawn out, and while this market still includes the placing of some business as low as 1.10c., Pittsburgh basis, an increasing firmness is developing with the probability that

1.15c. will soon be the minimum. We quote for Chicago delivery, mill shipment, 1.28c. to 1.38c., and from store 1.60c.

Plates.—The fact that local mills are unable to offer their customers better than eight or ten weeks' delivery on plates is causing many users to consider their future requirements. The situation contains many elements conducive to a stiffer market and higher prices. The volume of tonnage for boiler and tank manufacturers is becoming an increasingly important part of mill rollings. The Illinois Central and St. Paul railroads have bought a number of locomotives and several other of the Western roads have made similar purchases which, in the aggregate, run the locomotive buying up into very respectable figures. Important car orders have not materialized, but several purchases of special cars, including passenger, baggage, tank and ballast cars in lots up to 100, are noted. For Chicago delivery we quote, for mill shipment, 1.30c. to 1.38c. and from store 1.60c.

Sheets.—The volume of sheet business is greater than might be inferred from price conditions. Although orders are well maintained, prices continue to show some irregularity and there are evidences that the business being placed is not sufficient to satisfy various mills still willing to make low prices. We quote Chicago prices as follows: Carload lots, from mill, No. 28 black sheets, 2.03c. to 2.08c.; No. 28 galvanized, 3.03c. to 3.08c.; No. 10 blue annealed, 1.53c. to 1.58c. Prices from store, Chicago, are: No. 10, 1.90c.; No. 12, 1.95c.; No. 28 black, 2.30c.; No. 28 galvanized, 3.35c.

Bars.—A slight recession in the volume of bar tonnage being placed with the mills seems to have developed. Quotations, however, continue to show undiminished firmness, and for outright sales 1.15c. is the general minimum. Steel bar specifications are well maintained. We quote as follows, f.o.b. Chicago: Soft steel bars, 1.25c. to 1.33c.; bar iron, 1.15c. to 1.20c.; hard steel bars, rolled from old rails, 1.15c. to 1.20c. From store: Soft steel bars, 1.50c. to 1.55c., Chicago.

Old Materials.—Two causes have operated to establish in this market a considerable degree of firmness in scrap prices of at least a temporary character. The difficulties and delays in moving scrap into the market find many melters with ample purchases but no receipts. In some instances their need of melting stock is urgent, and prompt shipment orders are almost commanding a premium although conditions do not admit of any large movement. The market is also considerably interested in the reported purchases of shoveling and heavy melting steel by a large local steel company. The Baltimore & Ohio Railroad is offering a list which includes about 12,000 tons, in which there are 2500 tons of rails and 1000 tons of car wheels. The Chicago & Western Indiana is offering about 500 tons, and the Soo Line 200 tons. There has been a sharp inquiry for stove plate. It is understood that for iron car axles, of which there is only a fair small tonnage available, one railroad was offered \$18.75. We quote, for delivery at buyers' works, Chicago and vicinity, all freight and transfer charges paid, as follows:

Per Gross Ton.

Old iron rails.....	\$15.00 to \$15.50
Old steel rails, rerolling.....	12.50 to 13.00
Old steel rails, less than 3 ft.....	11.75 to 12.25
Relaying rails, standard section, subject to inspection.....	24.00
Old car wheels.....	13.00 to 13.50
Heavy melting steel scrap.....	10.75 to 11.25
Frogs, switches and guards, cut apart.....	10.75 to 11.25
Shoveling steel.....	10.25 to 10.75
Steel axle turnings.....	8.50 to 9.00

Per Net Ton.

Iron angles and splice bars.....	\$12.75 to \$13.25
Iron arch bars and transoms.....	13.75 to 14.25
Steel angle bars.....	10.00 to 10.50
Iron car axles.....	18.00 to 18.50
Steel car axles.....	15.50 to 16.00
No. 1 railroad wrought.....	11.00 to 11.50
No. 2 railroad wrought.....	10.00 to 10.50
Steel knuckles and couplers.....	10.00 to 10.50
Steel springs.....	10.50 to 11.00
Locomotive tires, smooth.....	12.75 to 13.25
Machine shop turnings.....	6.75 to 7.25
Cast and mixed borings.....	6.25 to 6.75
No. 1 busheling.....	9.00 to 9.50
No. 2 busheling.....	6.25 to 6.75
No. 1 boilers, cut to sheets and rings.....	7.00 to 7.50
Boiler punchings.....	12.50 to 13.00
No. 1 cast scrap.....	11.00 to 11.50
Stove plate and light cast scrap.....	9.25 to 9.75
Railroad malleable.....	10.25 to 10.75
Agricultural malleable.....	9.00 to 9.50
Pipes and flues.....	8.00 to 8.50

Wire Products.—The demand for wire products has been stunted by the prolonged season of cold weather, and shipments are being seriously retarded by trans-

portation conditions and a lack of cars. The breaking of the grip in which the weather is holding spring operations will be accompanied by a pent-up rush of orders and demands for immediate shipment, which, in anticipation, give promise of being unusually severe. We continue to quote as follows: Plain wire, No. 9 and coarser, base, \$1.58; wire nails, \$1.78; painted barb wire, \$1.78 to \$1.83; galvanized, \$2.08; polished staples, \$1.83; galvanized, \$2.13, all Chicago.

Cast Iron Pipe.—The number of municipal lettings for cast iron pipe in immediate prospect is disappointingly small. The only large purchase in sight is that for St. Louis, which has been previously mentioned. An award of several hundred tons at Kansas City was secured by the United States Cast Iron Pipe & Foundry Company and a number of other small tonnages were placed. We quote as follows, per net ton, Chicago: Water pipe, 4-in., \$27; 6 to 12-in., \$25; 16-in. and up, \$24.50, with \$1 extra for gas pipe.

Philadelphia

PHILADELPHIA, PA., March 12, 1912.

Coal and coke consumers are giving sharp attention to the necessity of covering for about six weeks' requirements in view of a possible coal strike. Prices of both coal and coke have advanced sharply. There has been a heavier volume of business moving in both crude and finished iron and steel and there has been a decided firming up of prices in some lines, although fabricated structural material is still extremely low. An interesting order for bridge work, involving 4000 tons for export to India, is announced. Considerable ship building is under negotiation and one of the local yards is stated to be preparing to take up negotiations for the building of several war vessels for a foreign country. The demand for steel billets is more active.

Iron Ore.—Rumors of cancellation of a foreign contract by one of the Eastern merchant furnaces are heard. A sale of upward of 5000 tons of New Jersey ore to a consumer in this district is noted. Odd lots of Lake ores are reported as being offered at a concession, but no business has resulted. Generally speaking, the situation as to prices has a somewhat weaker appearance. Importations during the week included 10,657 tons of Spanish and 9500 tons of Cuban ore.

Pig Iron.—Probably the most encouraging feature of the foundry iron market in this district is the fact that consumers are taking deliveries freely and frequently urging shipment. Statistics of both the Eastern and Virginia pig iron associations, while they show a decrease in unfilled orders on hand, due to the general lack of buying, show a decline in stocks on furnace banks, showing that deliveries have been in excess of the current make. Very little activity in buying is noted, transactions being confined to small lots. A trifle more firmness is shown, due to the fact that costs will likely move upward because of dearer coke. Inquiries are mostly for small lots, although an occasional 500-ton lot comes out. The cast-iron pipe makers are experiencing delays in delivery of iron and, while no definite inquiries have come out, at least one Delaware River melter is feeling the market and would take on a round lot if prices were satisfactory. Southern iron is not being offered freely, and a number of sellers in this district are unable to quote without first submitting inquiries to producers. One Virginia seller has advanced prices for early deliveries. Inquiry for malleable and charcoal iron has been less active. Little movement in rolling mill forge iron is reported and quotations are nominal. There has been no further inquiry for basic pig iron. One for 2000 tons of low phosphorus is, however, before the trade. Quotations for standard brands, delivered in buyers' yards in this district, show practically no change, sales being made, particularly in foundry grades, at the full spread of the market, depending on brand, quantity and delivery point, as follows:

Eastern Pennsylvania No. 2 X foundry.....	\$14.85 to \$15.25
Eastern Pennsylvania No. 2 plain.....	14.60 to 15.00
Virginia foundry	15.00 to 15.50
Gray forge	14.25
Basic	14.25 to 14.50
Standard low phosphorus	19.00 to 19.25

Ferrolloys.—Quotations of foreign 80 per cent. ferromanganese have been largely withdrawn, although sales of at least one moderate lot and some small business were put through at \$41, Baltimore, which is now considered a nominal quotation. Shipments are interrupted owing to the coal strike abroad and stocks on this side are reported small. Small sales, usually car-

load lots, of furnace ferrosilicon are reported at prices ranging from \$24.30 to \$26.30 for Bessemer grades. Fifty per cent. ferrosilicon is quiet at \$70, delivered.

Billets.—Orders have been more numerous, although usually small lots, but specifications are heavier. The leading producer in this district, which has for a considerable period had but five open-hearth furnaces active, has increased the number to six. There is still some inquiry for billets from abroad and 2180 tons was exported through this port in February. Prices are firm, basic open-hearth rolling billets being quoted at \$22.40 to \$23.40, and ordinary forging billets, \$26.40 to \$27.40, delivered in this vicinity.

Plates.—While there is still some irregularity in the way orders come out, several mills in this district have taken on a larger volume of business. In instances daily orders have equaled full mill capacity. Orders have occasionally been diverted from Western to Eastern mills, at full prices, owing to the inability of the former to make satisfactory deliveries. There is a general tendency to stiffen up on prices, and while it may be possible to do 1.25c., delivered, on desirable orders, the majority of the mills are now quoting 1.30c. for ordinary plates, delivered in this district. Considerable business in boat, bridge, tank and miscellaneous material is pending and the trade is taking a more encouraging view of the situation.

Structural Material.—The most important contract entered in this district was taken by the Phoenix Bridge Company, involving 4000 tons of bridge material for a new bridge over the Jumla River, in India. Several small orders for bridges have been taken by various fabricators, while bids go in today for a 300-ton bridge over the Schuylkill River at Pawlings. The Virginia Railway & Power Company, Richmond, Va., is taking bids on a new plant involving 1600 tons. Bids are in on 1800 tons for the new Vendig Hotel, in this city. The McClintic-Marshall Construction Company has the contract for the new foundry building for the Washington Navy Yard, 1100 tons. There has been a fair run of small business. An effort is being made to lift prices of plain shapes to a minimum of 1.30c., although prices of fabricated work are extremely low, some of the recent contracts in this city going, it is stated, at a basis of less than 1.15c., delivered here, for plain shapes.

Sheets.—The recent volume of business has been fully maintained. Operations are at full capacity, and orders on books show a constantly increasing volume of business. The bulk of the orders call for early shipment. While there has been some irregularity in prices of Western sheets, 1.95c. to 2c., delivered here, being quoted, Eastern mills making smooth, loose-rolled sheets readily obtain ¼c. to ½c. advance over the outside price.

Bars.—Very little movement in iron bars is reported. Current orders are usually small, and prices for desirable business are a shade easier, 1.22½c. being done on sharp competition, although some mills making the better grades of material will not shade 1.27½c., delivered. Some further inquiry for concrete bars is noted; about 1000 tons will be required for the new immigration pier, and a considerable tonnage will be required for the new Metropolitan Building. Steel bars are quiet, with makers showing a disposition to advance quotations.

Coke.—A very active demand for foundry coke for delivery prior to April 1 continues and prices cover a wide spread, dependent on conditions at the ovens. While \$2.50 at oven has been pretty generally done for prompt foundry coke, \$2.35 to \$2.40 can, no doubt, be done for some brands, although as high as \$2.75 has been reported. The bulk of the movement is in small lots, few producers being willing to contract under present conditions. Furnace coke has not been active, but quotations for prompt coke are higher. The following range of price, per net ton, covers the ordinary spread of the market, for deliveries in buyers' yards in this territory:

Connellsville furnace coke.....	\$4.10 to \$4.35
Foundry coke	4.60 to 5.00
Mountain furnace coke.....	3.70 to 3.95
Foundry coke	4.20 to 4.60

Old Material.—The market is sentimentally firmer, due to purchases in other districts and the diversion of some grades of material to other markets. No large purchases of heavy melting steel are reported in this district, although transactions between brokers have been reported against contract material at \$11.60 and \$11.75. Strictly No. 1 heavy melting steel is no longer reported available at \$11.50, delivered. From \$11.75 to \$12 is said to have been paid for steel on railroad lists.

Borings and turnings are slightly higher, but not as any result of sales to local consumers. An aggregate of 1000 tons of machinery cast scrap has been taken by cast iron pipe makers, at prices above the recent minimum quotation. The following range of prices about represents quotations at which ordinary current business for prompt shipment can be done for delivery in buyers' yards, eastern Pennsylvania and nearby points taking a freight rate from Philadelphia varying from 35c. to \$1.35 per gross ton, for shipment ranging from prompt to the remainder of the year:

No. 1 heavy melting steel scrap and crops.....	\$11.75 to \$12.00
Old steel rails, rerolling (nominal).....	13.50 to 14.00
Low phosphorus heavy melting steel scrap..	15.25 to 15.75
Old steel axles	17.00 to 17.50
Old iron axles (nominal).....	22.00 to 23.00
Old iron rails (nominal).....	15.50 to 16.00
Old car wheels	11.75 to 12.25
No. 1 railroad wrought	14.00 to 14.50
Wrought iron pipe	11.50 to 12.00
No. 1 forge fire	9.75 to 10.25
No. 2 light iron (nominal).....	6.75 to 7.25
Wrought turnings	8.75 to 9.25
Cast borings	8.50 to 9.00
Machinery cast	13.25 to 13.75
Railroad malleable (nominal).....	11.75 to 12.25
Grate bars, railroad	10.00 to 10.50
Stove plate	9.50 to 10.00

Boston

BOSTON, MASS., March 12, 1912.

Old Material.—The sentiment is better and the dealers hope that it will develop into a real improvement. At present the change in feeling is somewhat intangible but wrought turnings and cast borings have risen 25c. The prices quoted below are those offered by the large dealers to the producers and to the smaller dealers and collectors, per gross ton, carload lots, f.o.b. Boston and other New England points taking Boston rates from eastern Pennsylvania points. In comparison with Philadelphia prices the differential for freight of \$2.30 a ton is included. Mill prices are approximately 50c. a ton more than dealers' prices.

Heavy melting steel.....	\$8.75 to \$9.00
Low phosphorus steel.....	11.45 to 11.95
Old steel axles	14.00 to 14.50
Old iron axles	17.00 to 18.00
Mixed shafting.....	13.00 to 13.50
No. 1 wrought and soft steel.....	10.00 to 10.50
Skeleton (bundled)	7.00 to 7.50
Wrought iron pipe.....	8.50 to 9.00
Cotton ties	7.00 to 7.50
No. 2 light	4.50 to 5.00
Wrought turnings	6.00 to 6.50
Cast borings	5.50 to 6.00
Machinery, cast	12.50 to 13.00
Malleable	8.75 to 9.25
Grate bars	6.00 to 6.50
Stove plate	8.00 to 8.50
Cast iron car wheels.....	11.75 to 12.00

Cleveland

CLEVELAND, OHIO, March 12, 1912.

Iron Ore.—The activity in pig iron during the past few days has caused ore sellers to take a brighter view of the situation and they expect that there will be some stir in the ore market in the next two or three weeks. One or two buyers have indicated that they will be ready to figure on their requirements about the end of March and have asked sellers to be in position to quote definite prices about that time. Furnacemen are still talking a 50-cent reduction, but sellers generally insist that it should not be over 25c. Some ore has been offered at 50c. a ton lower than last year, but not enough to establish the market. Ore handling charges on Lake Erie docks will be reduced about one-half. No official announcement has been made, but the new charge will probably be 7½c. or 8c. Up to 1910 this charge was 20c. a ton, and a cut of 5c. was made that year. In recent years, owing to the installation of more modern ore handling equipment at Lake Erie docks, the cost of unloading has been materially reduced. With the lower cargo handling charge will probably come a reduction of 5c. in freight rates on ore. The rate last year from ports at the head of Lake Superior was 60c. a ton. Deducting the unloading charge the vessels receive a net rate of only 45c. a ton. Ore shipments from Lake Erie docks during February exceeded expectations. Dock shipments for February were 439,254 tons, as compared with 284,599 tons in January. Shipments have increased considerably since March 1. If in March and April they equal those of 1911, when approximately 2,500,000 tons of ore were sent from the docks, there would be about 7,400,000 tons on the docks May 1, as compared with 7,650,000 tons May 1, 1911. However, it

is expected that the March and April shipments will exceed those of the two corresponding months a year ago. We quote prices as follows: Old range Bessemer, \$4.50; Mesaba Bessemer, \$4.25; old range non-Bessemer, \$3.70; Mesaba non-Bessemer, \$3.50.

Pig Iron.—The heavy buying of basic and Bessemer iron in other territories is reflected in an improved tone in the local market. Foundry iron shows a larger volume of inquiries, and these are expected to result in orders for a considerable tonnage in the next few days. Sales of basic and malleable iron in the St. Louis district within the past week, aggregating from 15,000 to 20,000 tons, are reported, some of this business going to a local selling agency. The Algoma Steel Company is in the market for 50,000 tons of iron, about one-half basic and one-half Bessemer, for the second and third quarter delivery. As this iron is not wanted for shipment until lake navigation opens its purchase may be delayed a short time. The United Steel Company, Canton, Ohio, is in the market for 3000 tons of basic for April delivery. Basic is firm, and \$12.50, Valley furnace, seems to be the minimum quotation. One Cleveland selling agency has advanced its price for foundry iron to \$13.50, Valley furnace, for No. 2, but \$13.25 still appears to be the general quotation. We note the sale of 500 tons of No. 2 foundry to a Cleveland consumer at \$13.25, for delivery in the second quarter. A leading Michigan automobile maker has bought 2300 tons of Northern and Southern foundry and high manganese iron. Perry furnace, Erie, Pa., was blown in March 7, and Upson furnace, Cleveland, which has been down for repairs, was blown in March 9. Another northern Ohio stack may go in blast shortly. The demand for Southern iron has improved, and consumers are showing an interest in covering for their last half requirements. One selling agency reports the sale during the week of over 5000 tons of Southern iron. One lot of 1500 tons of No. 2 was sold at \$10.50, Birmingham, for delivery through the last half. Other sales of 1000 tons and under were made at the same price, for delivery through the second and third quarters. We quote the following prices for prompt shipment and for the second quarter, delivered Cleveland:

Bessemer	\$14.90
Basic	13.25
Northern foundry No. 2.....	13.25
Southern foundry No. 2.....	\$14.60 to 14.85
Gray forge	12.50
Jackson County silvery, 8 per cent. silicon.....	17.05

Finished Iron and Steel.—Current orders and specifications are larger, and the market shows a decided improvement in the volume of inquiries for round lots. In addition to current orders some inquiry is coming out for third quarter contracts. While there is a better demand for nearly all lines the improvement is especially noticeable in plate and structural inquiries. The price situation also shows further improvement. Steel bars are firm at 1.10c., Pittsburgh. While plates can still be had at 1.10c. some of the leading selling agencies are quoting 1.15c. as a minimum. Structural material is firm at 1.15c. and the building situation is gradually improving. Local fabricators are now figuring on considerable work, and a good volume of business is in prospect in the near future. An addition to the Hotel Euclid will require from 400 to 500 tons. Plans are being prepared for a seven-story addition to the plant of Bardons & Oliver, Cleveland, for which steel will be required. The demand for sheets is only moderate and prices show no material improvement. Business is being done at 1.80c. for No. 28 black and 2.80c. for No. 28 galvanized. There is a fair demand for forging billets, which are being sold in car lots at \$26.50, Pittsburgh. The bar iron market is quiet. We quote iron bars at 1.20c., Pittsburgh.

Coke.—The foundry coke market is quite active and prices have advanced. Consumers, fearing trouble in getting shipments in case of a coal miners' strike, are ordering largely in excess of requirements in order to stock up, and sellers generally are unable to fill these additional orders. One local selling agency has advanced its price to \$2.75 for 72-hr. Connellsville coke. Other prices for this grade range from \$2.40 to \$2.65 per net ton at oven. Furnace coke is firm at \$2.

Old Material.—The local sentiment is better as a result of the recent buying in Pittsburgh district, but there is very little improvement in the demand in this market. Dealers look for better prices and have advanced their quotations on heavy steel scrap, borings and turnings 25c. a ton. One of the largest local consumers that dealers expected would be in the market for steel making scrap has a large supply on hand and will not want a round tonnage for several weeks. The

Norfolk & Western Railroad has a list out which will close March 20. Dealers' prices, f.o.b. Cleveland, are as follows:

Per Gross Ton.	
Old steel rails, rerolling.....	\$12.25 to \$12.75
Old iron rails.....	14.00 to 14.50
Steel car axles.....	17.50 to 18.00
Heavy melting steel.....	11.25 to 11.75
Old car wheels.....	12.00 to 12.50
Relaying rails, 50 lb. and over.....	22.50 to 23.50
Agricultural malleable.....	10.50 to 11.00
Railroad malleable.....	11.50 to 12.00
Light bundled sheet scrap.....	9.50 to 10.00
Per Net Ton.	
Iron car axles.....	\$18.50 to \$19.00
Cast borings.....	6.50 to 6.75
Iron and steel turnings and drillings.....	7.00 to 7.25
Steel axle turnings.....	7.25 to 7.75
No. 1 busheling.....	9.50 to 10.00
No. 1 railroad wrought.....	11.00 to 11.25
No. 1 cast.....	11.25 to 11.75
Stove plate.....	9.00 to 9.25
Bundled tin scrap.....	11.00 to 11.50

Cincinnati

CINCINNATI, OHIO, March 11, 1912.

Pig Iron.—Consumers are taking a better interest in the market, and while business transacted is of a small nature the aggregate makes a better showing than for two or three weeks. The Southern price situation is clearing up some, but there is still a small quantity of No. 2 foundry, for spot shipment, that can be bought as low as \$10, Birmingham. However, considerable of this is understood to be resale material, and it is expected to be cleaned up shortly. The majority of Southern furnaces are holding firm at \$10.50 for any first half shipment and numerous small sales are being made daily at this figure, but for nearby movement \$10.25 more nearly represents the market. It is rumored that one or two Southern producers are quietly opening their books for third quarter business, \$10.50 representing the figure that they are willing to insert in contracts for that delivery. Northern furnace interests are looking ahead for last half business, and a number of quotations have been made, ranging all the way from \$13.25 to \$13.50, Ironton, but a central Ohio melter was able to obtain 500 tons for last half shipment at the present prompt quotation of \$13 at furnace. Among inquiries out is one for 1000 tons of Northern No. 2 foundry for a central Indiana consumer. An Ohio manufacturer also wants about the same quantity of Northern and Southern foundry grades mixed. A Michigan melter bought through a local agency 1000 tons of special Virginia iron for second quarter shipment. There is an increased demand for ferromanganese and the price is advancing. Charcoal iron also shows some improvement. Based on freight rates of \$3.25 from Birmingham and \$1.20 from Ironton, we quote, f.o.b. Cincinnati, as follows, for prompt shipment:

Southern coke, No. 1 foundry and 1 soft.....	\$13.75 to \$14.25
Southern coke, No. 2 foundry and 2 soft.....	13.25 to 13.75
Southern coke, No. 3 foundry.....	12.75 to 13.25
Southern coke, No. 4 foundry.....	12.50 to 13.00
Southern gray forge.....	12.50 to 13.00
Ohio silvery, 8 per cent. silicon.....	16.45 to 16.95
Lake Superior coke, No. 1.....	14.70 to 14.95
Lake Superior coke, No. 2.....	14.20 to 14.45
Lake Superior coke, No. 3.....	13.70 to 13.95
Basic, Northern.....	14.20 to 14.45
Standard Southern car wheel.....	25.25 to 25.50
Lake Superior car wheel.....	19.00

Coke.—Prices in all three districts are soaring. Several small sales of 72-hr. coke, for spot shipment, were made recently in the Connellsville district all the way from \$2.65 to \$2.90 per net ton, at oven, and future delivery figures are on the same high level. Furnace coke is being held around \$2.10 to \$2.35 for immediate shipment, although it is probable that strictly last half business might be taken on at a slight reduction. The Wise County and Pocahontas producers are now asking about the same prices as those in the Connellsville field. The threatened coal miners' strike has advanced coal prices until a coke producer can get equally as much for his coal as for coke, and as a consequence is reluctant to take on any new coke business even at prevailing quotations.

Finished Material.—Specifications on steel bar contracts are coming in at a satisfactory rate, but new business is very scarce. Structural material is also dull, but a number of new building prospects hold out hope for a busy spring season. Steel bars are quoted in this market around 1.15c., Pittsburgh, but a desirable tonnage could probably be placed at a reduction. The warehouse quotation on steel bars is 1.60c. and on structural material 1.70c.

Old Material.—There is a slightly better demand for

heavy melting steel scrap, and the price has advanced about 25c. a ton over last week's quotation. Other classes of scrap are moving slowly, with no immediate prospect of any improvement. The minimum figures given below represent what buyers are willing to pay for delivery in their yards, southern Ohio and Cincinnati, and the maximum quotations the selling prices, f.o.b. at yards:

Per Gross Ton.	
Bundled sheet scrap.....	\$6.75 to \$7.25
Old iron rails.....	12.25 to 12.75
Relaying rails, 50 lb. and up.....	20.00 to 21.00
Rerolling steel rails.....	11.00 to 11.50
Melting steel rails.....	8.75 to 9.25
Heavy melting steel scrap.....	9.00 to 9.50
Old car wheels.....	10.75 to 11.25
Per Net Ton.	
No. 1 railroad wrought.....	\$9.50 to \$10.00
Cast borings.....	5.25 to 5.75
Steel turnings.....	5.50 to 6.00
No. 1 cast scrap.....	9.75 to 10.25
Burnt scrap.....	6.25 to 6.75
Old iron axles.....	15.75 to 16.25
Locomotive tires (smooth inside).....	11.25 to 11.75
Pipes and flues.....	6.75 to 7.25
Malleable scrap.....	7.25 to 7.75

Birmingham

BIRMINGHAM, ALA., March 11, 1912.

Pig Iron.—There is a much stronger feeling in the iron and steel market here. Birmingham furnace yards have been entirely cleaned up on gray forge and Nos. 3 and 4 foundry, and it is most difficult to place any new orders for any of these grades simply because the iron is not available for prompt shipment. There have been no sales of consequence the past week, though there have been a great many feelers. It seems, however, that sellers are reluctant to take on business, and one reason assigned for this disposition is the coal situation. The British strike is going to materially affect pig iron production there if it continues. Then it seems certain that there will be a shut down of four to six weeks in the coal fields in the Central West beginning April 1. All this means a probable scarcity of coke with a higher cost. On such presumption it would appear that sellers are wise to take the safe side of the market at this time and sell only sparingly. Quotations are as follows, f.o.b. cars, Birmingham:

No. 1 foundry and No. 1 soft.....	\$11.00
No. 2 foundry and No. 2 soft.....	10.50
No. 3 foundry.....	10.00
No. 4 foundry.....	9.75
Gray forge.....	9.50
Standard basic.....	10.50
Off basic.....	10.00

Cast Iron Pipe.—The pipe foundries of the district continue to report a large volume of shipments. Neither makers of water pipe nor small pipe seem to have any unusual stock on hand at any points in the South. The cast iron pipe business has witnessed a long period of low prices, but with a stronger pig iron market quotations are very firm and it is difficult now to get any producers of water pipe to shade prices. There is a great inquiry from the West and Central West in the aggregate, but no special big tonnages are now pending. Quotations remain per net ton, f.o.b. foundries, Birmingham district, as follows: 4 to 6 in., \$23; 8 to 12 in., \$22; over 12-in. average, \$21, with gas pipe taking the usual differential of \$1 per ton higher.

Old Material.—A little more life is showing in the scrap iron demand. Dealers are feeling a trifle better and there is now a larger movement than during the winter. Still, dealers are not bidding against themselves in order to add to their stocks. Quotations per gross ton, f.o.b. dealers' yards, are as follows:

Old iron axles (light).....	\$12.50 to \$13.00
Old steel axles (light).....	11.50 to 12.00
Old iron rails.....	11.50 to 12.00
No. 1 railroad wrought.....	10.50 to 11.00
No. 2 railroad wrought.....	9.00 to 9.50
No. 1 country wrought.....	6.00 to 6.50
No. 2 country wrought.....	5.50 to 6.00
No. 1 machinery.....	8.50 to 9.00
No. 1 steel.....	8.00 to 8.50
Tram car wheels.....	7.50 to 8.00
Standard car wheels.....	9.50 to 10.00
Light cast and stove plate.....	6.00 to 6.50

Coal and Coke.—There is a very spirited demand for all grades of steam coal. The ports on the Gulf are doing a large business in export and bunkering coal. Alabama coal will make a record for itself this year in the volume of export and bunkering business. Foundries are endeavoring to lay in a little extra stock of coke throughout the South.

The German Iron Market

New Business Less Active

BERLIN, February 29, 1912.

After the numerous price advances of the past month it is but natural that a quieter tendency should now set in. This week there is accordingly only one advance to report. The wholesalers of the Silesian district several days ago raised bars and heavy and light plates 5 marks; but this action only corresponds to the advances recently made by manufacturers. In some sections of the trade, especially in finished products, quieter conditions are also reported in new business. In the Belgian market it is stated that consumers are hesitating to make engagements at the recently advanced prices and that the foreign markets are also showing greater reserve. This causes a slight feeling of uncertainty in the German trade, where there is some apprehension of a change tendency appearing before long. The English market, too, has grown less active, owing to the miners' strike that begins tomorrow. On the other hand, the strong tendency continues in the French market. Several days ago the Basic Steel Association advanced the prices of all sorts of semi-manufactured products 10 francs per ton. The quieter tone in the German market is also promoted by the uncertainty regarding the prolongation of the Steel Works Union, as well as by efforts of the Imperial Bank to induce the private banks to take measures to restrict credits to manufacturing and other concerns.

Ordering in the pig-iron market grew unusually active after sales were resumed at higher prices several weeks ago. The works sent in their orders so rapidly that the bulk of the possible business has already been done, and a quieter tone now prevails. The Luxemburg-Lorraine furnaces are already sold out till the end of the year. The foreign demand for pig continues very heavy; it is reported that the orders are so large that they can only with some difficulty be placed by the syndicate. The market for old material and scrap continues firm under an active demand; the open-hearth steel plants are calling for large amounts, and the foreign market is also an active buyer.

The orders of home consumers of semi-rolled steel for the second quarter have been placed with the Union, which is now occupied with making allotments to the various mills. The demands of the market are greater than the allotments of the Union in these products, and the outside open-hearth plants are getting much of the overflow business. The foreign market also continues to buy half-rolled material freely, and is calling briskly for deliveries on contracts. There has been no relaxation of prices on foreign orders with German producers. Foreign orders for steel rails also continue to come in satisfactorily. Business in beams and other structural shapes is improving as the season for reopening active building operations draws nigh. Dealers are buying actively, and a considerable volume of foreign business is also coming in. Structural shapes for construction shops are in heavy demand at firm or rising prices.

The bar trade has become quieter so far as the volume of new business is concerned, but prices remain firm. It is mentioned that few works will now take orders for basic steel bars at less than 115 marks, but according to other reports lower prices are conceded. The mills are fully supplied with work till the end of June, and many of them for longer periods. Mills running on bands have work beyond the end of June; prices are very firmly held. Cold-rolled bands also continue very active, and a strong foreign demand is noted, in addition to the active buying of home consumers. Strips for steel tubing are exceedingly active, corresponding to the large business doing by the tube mills. The latter have large orders both from the home and the foreign market.

The activity of the heavy plate mills previously reported continues undiminished. This is particularly the case with ship plates. The combination controlling this specialty has recently informed the individual members that it is in a position to assign them amounts 30 per cent. in excess of their allotments for 1912. New orders for ship plates have come in this month, notwithstanding the heavy business taken in December and January. There is also an excellent business doing in plates of medium thicknesses. In thinner grades there is enough work on hand for several months, but the export trade has grown more difficult owing to the recently advanced prices. Since the wire rod mills decided to leave their bottom price unchanged at 122.50 marks, buying has become more active. There was a strong disposition on the part of the trade combination to raise the price 2.50

marks, but this was not done owing to the unsatisfactory prices for drawn wire and wire-nails. In the latter a heavy demand is reported, but at low prices. In certain countries the competition of American nails is very sharp.

St. Louis

ST. LOUIS, Mo., March 11, 1912.

Increasing inquiry for small lots of material, raw and finished, sustains the belief here that the market will show activity without a preceding recurrence of lower prices. Quotations are well held.

Pig Iron.—Inquiry is principally for small lots, car-loads, 100 and 200 tons, and a number of such orders have been placed during the week, running to a fairly satisfactory total. The demand under specifications on contract is keeping up well. Future inquiry is entirely for first and second quarter. There is positively nothing of second half character in the market. No. 2 Southern stands steady at \$10.50 and No. 2 Northern at \$13. The inquiries of the week include one of 1700 tons of different grades for mixing, another for 600 tons of No. 2 Southern and several for 200 tons, all but the first named being for prompt delivery and that particular one possessed of some speculative elements. Collections remain excellent. No movement of basic or malleable is noted.

Coke.—The feature of the coke market here has been the sudden stiffening of prices, best selected foundry, Connellsville, being quoted \$2.50 to \$2.65 at oven with little disposition to sell at that figure as coal can be sold at a price which makes the coke figure unprofitable. The shortage in the supply of coke for this territory is emphasized by the continued car shortage. The high prices have already resulted in the turning down by dealers of orders of considerable aggregate. By-product coke has also stiffened with the rest and none is moving.

Finished Iron and Steel.—There is a continuance of the steady movement, but practically everything is on specifications for specific work with prompt shipment conditions attached. On bars the specifications continue to show an excellent total in the tonnage. Orders for plates are fair with the market at 1.10c., Pittsburgh. In light rails the lumber interests seem to have finished purchasing for the present, while the coal interests are entirely out of the market, with not the slightest likelihood of coming in again until the strike situation is settled. Track fastenings have been in good demand, due to the approach of the spring repairing season. In standard rails there has been increasing inquiry. During the week the Wabash took 15,000 tons of 90-lb. rails and a Southwestern road 500 tons. The former is expected to order further in a short time.

Old Material.—The rather heavy lists which closed last week went at prices which were high under the circumstances. There is an unconfirmed report that the Colorado Fuel & Iron Company took part of the offerings, but local dealers also got considerable. This week the only list out is one of 500 tons from the Mobile & Ohio. We quote the following prices on scrap, f.o.b. St. Louis:

Per Gross Ton.

Old iron rails	\$14.00 to \$14.50
Old steel rails, re-rolling.....	11.00 to 11.50
Old steel rails, less than 3 ft.....	11.25 to 11.75
Relaying rails, standard section, subject to inspection	21.50 to 22.00
Old car wheels	13.25 to 13.75
Heavy melting steel scrap.....	10.50 to 11.00
Frogs, switches and guards cut apart.....	10.00 to 10.50

Per Net Ton.

Iron fish plates	\$12.50 to \$13.00
Iron car axles	17.50 to 18.00
Steel car axles	15.00 to 15.50
No. 1 railroad wrought.....	11.00 to 11.50
No. 2 railroad wrought.....	10.00 to 10.50
Railway springs	9.25 to 9.75
Locomotive tires, smooth	11.00 to 11.50
No. 1 dealers' forge	8.00 to 8.50
Mixed borings	6.00 to 6.50
No. 1 busheling	8.50 to 9.00
No. 1 boilers, cut to sheets and rings.....	7.50 to 8.00
No. 1 cast scrap.....	10.00 to 10.50
Stove plate and light cast scrap.....	8.00 to 8.50
Railroad malleable	8.50 to 9.00
Agricultural malleable	7.50 to 8.00
Pipes and flues	7.50 to 8.00
Railroad sheet and tank scrap.....	7.00 to 7.50
Railroad grate bars.....	7.00 to 7.50
Machine shop turnings.....	7.00 to 7.50

New York

NEW YORK, March 13, 1912.

Pig Iron.—There is considerably more inquiry this week and rather more business is being done, but the inquiries are thus far more conspicuous than sales. The expectation of a coal strike is entering into calculations in a good many cases, but it has not figured largely as yet in pig-iron buying. Most of the inquiries in this market seem to have come in the natural order, being for second-quarter and third-quarter shipment for the most part. There is very little of the call for prompt iron which would be taken as precautionary. The principal effect of the strike talk has been seen in the coal and coke markets. In some cases foundries and blast furnaces have been trying to accumulate coke, but not much headway has been made as the coke makers are having difficulty in filling their contract orders. One of the largest inquiries in the market is from the General Electric Company for its Lynn plant, amounting to 5000 tons of two or three grades of iron, chiefly ordinary foundry. A railroad equipment company is in the market for several thousand tons. There is some inquiry from New Jersey also and from New York State. In New England recent sales of Western New York iron have been made at \$15.25 and lower for No. 2 foundry. The heavy buying of steel-making iron in the Central West has had only a sentimental effect on the Eastern pig-iron market. Prices are about those which have prevailed in the past month and the real difference between this week and preceding ones is that conditions now are not worse and sentimentally, perhaps, are better. A few sales of from 500 to 1000 tons each are reported and probably 15,000 to 20,000 tons is under negotiation. Eastern furnaces report more inquiry for basic iron. We quote as follows for Northern iron at tide-water: No. 1 foundry, \$15; No. 2 X, \$14.50 to \$14.75; No. 2 plain, \$14.50. We quote Southern iron at \$14.75 to \$15 for No. 1 foundry and \$14.50 to \$14.75 for No. 2.

Finished Iron and Steel.—The difference in the volume of business coming to the various representatives of mills was perhaps more pronounced this week than is usual, some offices reporting a satisfactory condition, while others found new demand rather scarce. The market for steel bars is still regarded as 1.10c., Pittsburgh, and attractive business in plates has also gone at this figure, while plain structural material is placed at less than 1.10c., notwithstanding some mills are asking 1.15c. and 1.20c. Reinforcing concrete bars continue to be a prominent feature of the bar market and in the local plate market the demand is generally good for all sizes except the widest. Few new building projects have appeared and the total contract awards do not make a large aggregate. While bar iron, which is moving at a fair volume, is regarded as 1.20c. to 1.25c. at mill for the refined product, one carload was lately purchased without any effort for 1.15c., mill. Of the structural awards mention may be made of the following: Two pavilions, Bellevue Hospital, 2500 tons, to Levering & Garrigues Company; foundry building, Navy Yard, Washington, 1000 tons, to McClintic-Marshall Construction Company; loft on West Thirty-eighth street, 1000 tons, and loft on West Thirtieth street, 750 tons, both to the John J. Radley Iron Works; Biograph building, 175th street, New York, 500 tons, to the Phoenix Iron Company; building for the Shultz Bread Company, Jamaica, L. I., 400 tons, to the Hay Foundry & Iron Works; municipal building, Hartford, Conn., 250 tons, to the American Bridge Company; loft on West Broadway, 300 tons, to the A. E. Norton Company; building for locomotive repairing, Virginia Railway Company, 450 tons, to the Roanoke Bridge Company; boiler house, Pawtucket Railways, 200 tons, to the New England Structural Company; building for the Norfolk & Western, 300 tons, to the Virginia Bridge & Iron Company; power transmission poles for the New York Central, 200 tons, to the McClintic-Marshall Construction Company, and a 9-story studio building, 116 West Fifty-ninth street, 120 tons, to Mulcahy & Gibson. One interesting inquiry on which bids have gone in covers about 150 tons of bridge repair material for the New York Central for the remainder of 1912. Quotations are: Steel bars, plates and plain structural material, 1.26c. to 1.31c.; bar iron, 1.25c. to 1.30c., all New York. Plain material from store, New York, 1.65c. to 1.75c.

Cast-Iron Pipe.—The New York City contract for high-pressure water service, requiring 6000 tons of pipe, on which bids were opened March 6, was awarded to the Beaver Contracting & Engineering Company, and it is understood that the pipe will be supplied by an Eastern maker. The city of Rochester, N. Y., opens bids today on 3000 tons of various sizes of water pipe. Buy-

ing by water and gas companies is quite active, and foundries are entering good orders from such sources. The improved condition of the cast-iron pipe trade is indicated by the fact that a prominent company now has orders on its books representing a greater aggregate tonnage than at the corresponding time for the past five years. It is to be presumed that other makers are in similarly good condition. A better tone pervades the market, although prices on carload lots of 6-in. are unchanged at \$22 to \$23, tidewater, per net ton.

Old Material.—Although no increase is reported in the demand, the market is sentimentally stronger. Dealers are encouraged by the more improved reports coming from other sections of the country, and look for better business as spring opens. The worst section of the scrap trade is the business with bar iron mills, which at present seems completely lifeless. Quotations are as follows, per gross ton, New York and vicinity:

Old girder and T-rails for melting.....	\$9.00 to \$9.50
Heavy melting steel scrap.....	9.00 to 9.50
Relaying rails	20.00 to 20.50
Rerolling rails (nominal).....	11.50 to 12.00
Old iron car axles.....	19.00 to 20.00
Old steel car axles.....	13.50 to 14.00
No. 1 railroad wrought.....	11.50 to 12.00
Wrought iron track scrap.....	10.50 to 11.00
No. 1 yard wrought, long.....	9.50 to 10.00
No. 1 yard wrought, short.....	9.00 to 9.50
Light iron	4.25 to 4.75
Cast borings	5.75 to 6.25
Wrought turnings	6.50 to 7.00
Wrought pipe	9.25 to 9.75
Old car wheels.....	11.00 to 11.50
No. 1 heavy cast, broken up.....	11.00 to 11.50
Stove plate	8.75 to 9.00
Locomotive grate bars	9.00 to 9.50
Malleable cast	9.00 to 9.50

Ferroalloys.—Prices for ferroalloys are unchanged in New York, and the base price of \$41, Baltimore, for 80 per cent. ferromanganese and \$70, Pittsburgh, for 50 per cent. ferrosilicon continue. A scarcity of ferromanganese may come because of the English coal strike. Shipments are en route here, but there have been no new shipments since the strike trouble began. There has been a fair run of new business in ferrosilicon.

Buffalo

BUFFALO, N. Y., March 11, 1912.

Pig Iron.—Most producers report sales as better in the aggregate than for the past three weeks and that a more active interest is being taken by consumers for future requirements. A majority of the furnaces, however, are averse to quoting for shipment beyond July 1 with the present unsettled conditions as regards ore, coal, etc., particularly as they are pretty well provided with orders for the next few months and shipments are going forward from blast furnaces at a heavy rate, approximating their full productive capacity. It is stated that the week's inquiries include 10,000 tons of basic with probably 15,000 tons of foundry irons and a considerable tonnage of malleable. Prices show a decidedly stiffer tendency. Progress is being made in clearing up the freight congestion on railroads in Buffalo territory, but freight movements are still far from being on a normal basis and pig iron and coke consumers continue to be greatly bothered by the slow arrival of materials. Embargoes which have been placed on Canadian business owing to congested conditions on Canadian roads have completely upset the calculations of Canadian consumers dependent on a portion of American iron in their mixtures. For first half delivery we quote as follows, f.o.b. Buffalo:

No. 1 X foundry.....	\$14.00 to \$14.50
No. 2 X foundry.....	13.75 to 14.00
No. 2 plain	13.50 to 13.75
No. 3 foundry	13.25 to 13.50
Gray forge	13.00 to 13.25
Malleable	13.75 to 14.25
Basic	13.75 to 14.25
Charcoal	15.75 to 12.25

Finished Iron and Steel.—One of the features of the week has been the increased demand for structural material, due, no doubt, to the mild weather and the resumption of outside construction work, resulting in a good many special rush orders for small jobs. Specifications on bar material contracts have been quite heavy also, the tonnage placed for the first 10 days of March having been considerably larger than for the same period last month. Deliveries, owing to the numerous requests for rush shipments on steel bars and bar products, are becoming more extended and some jobbers are experiencing difficulty in keeping up stocks on account of delay in deliveries. Most selling agencies believe the indications point to the setting in of a good

buying movement very shortly. The price situation is improving slightly. In plates and shapes 1.15c., Pittsburgh, can be done on attractive business, but 1.20c. it being frequently asked and obtained on small lots. Steel bar prices are 1.10c. on attractive specifications for prompt shipment and 1.15c. for less than carload orders, or for extended delivery. One interest reports placing two carload lots at 1.12½c., Pittsburgh. Bids will be opened this week for steel for the Charles B. Hill store and loft building, Buffalo, about 200 tons. Metz Bros., Buffalo, were low bidders on the general contract for both the Auditorium and the Clinic Building at Cornell University, Ithaca, and will soon sublet contract for the 300 to 400 tons of steel. Revised plans are being prepared for the Technical High School, Bennett Park, Buffalo. It is not expected that the steel tonnage will be much reduced from the 1400 tons specified by the original plans.

Old Material.—The tone of the market is considerably stronger and the indications are that larger buying will soon result from the more active inquiry now in evidence. The transactions for the week have not been large, however, as dealers are inclined to hold quite stiffly for higher prices, and the demand has not yet been sufficient to cause any quotable advance. The railroad situation is improving and shipments are moving with less delay. We quote as follows, per gross ton, f.o.b., Buffalo:

Heavy melting steel.....	\$12.50 to \$12.75
Low phosphorus steel.....	15.75 to 16.00
No. 1 railroad wrought.....	14.00 to 14.25
No. 1 railroad and machinery cast scrap....	13.50 to 14.00
Old steel axles.....	18.50 to 19.25
Old iron axles.....	22.00 to 22.50
Old car wheels.....	11.75 to 12.00
Railroad malleable.....	12.50 to 12.75
Boiler plate, sheared.....	13.75 to 14.25
Locomotive grate bars.....	11.00 to 11.25
Pipe and tank.....	9.50 to 10.00
Wrought iron and soft steel turnings.....	7.25 to 7.50
Clean cast borings.....	6.50 to 6.75

British Industry Blocked Effect of Coal Strike on the Iron Trade— American Steel Offered

(By Cable.)

BIRMINGHAM, ENGLAND, March 13, 1912.

The production of pig iron in Great Britain has practically ceased. Every furnace in Scotland and every furnace producing foundry iron in the Cleveland district has been banked. Steel works are closing daily. All rail mills are idle. The finishing trades are now feeling the effects of the coal strike. Nearly all tin plate works have shut down for lack of bars. All engineering plants are reducing their staffs. Shipyards are closing. The inability of railroads to handle traffic is becoming a threatening feature and is forcing many works well provided with fuel to close down.

Stocks of Cleveland pig iron are rapidly decreasing, the reduction being 20,000 tons thus far this month, owing to heavy shipments abroad. These will probably continue until fuel for working hoists and locomotives is exhausted. Only a few more days' supply is available for this work.

The United States Steel Corporation and one or two American independent companies are offering July-December sheet bars at 95s c.i.f. Wales. Buyers offer 92s 6d. Welsh tin plate bars are unquotable. We quote the market as follows, there being slight advances in pig iron and tin plates:

Cleveland pig iron warrants (closing Tuesday), 50s 7½d.

No. 3 Cleveland pig iron, makers' price, f.o.b. Middlesbrough, 51s 6d.

German sheet bars, f.o.b. Antwerp, 95s.

German 2-in. billets, f.o.b. Antwerp, 92s.

Steel bars, export, f.o.b. Clyde, £6 12s 6d.

Steel joists, 15 in., export, f.o.b. Hull or Grimsby, £6 2s 6d.

Steel ship plates, Scotch, delivered local yard, £7 7s 6d.

Steel black sheets, No. 28, export, f.o.b. Liverpool, £9.

Steel rails, export, f.o.b. works port, £5 17s 6d.

Tin plates, cokes, 20 x 14, 112 sheets, 108 lb., f.o.b. Wales, 13s 9d (nominal).

(By Mail.)

March 1.

It is impossible to discuss the iron and steel situation in Great Britain without what might at a distance seem to be paying an inordinate degree of attention to the coal difficulties, but these, in sober truth, eclipse everything else. Seldom, if ever, in the acute phases of industrial unrest have the opinions of men of affairs whose judgment commands respect been so divided as now. Curiously enough, the line of cleavage was well defined, the merchants and banking section holding with one accord that the trouble would never reach the acutest stage, while equal unanimity in the contrary view was shown by the colliery owners and the manufacturers. From end to end of the country manufacturers gave notice to their workmen to terminate contracts if the colliers went out. The condition of traffic on the railroads, already hopelessly blocked with merchandise, became worse than ever; for coal was rushed forward to all points, and government departments and public bodies were almost in a panic, for notices were actually posted in public offices urging the clerical staff to keep the fires in the rooms as small as possible. Collieries were unable to get clear of the coal they raised, and the railroad companies practically commandeered all the available cars to insure their own supplies. The largest makers of galvanized and black sheets, John Summers & Sons, Ltd., sent out notices on February 20 that their works would close on the following day because they were unable to get fuel from the collieries with which they had contracts.

The miners determined to maintain their position, in which the main contention is for a minimum wage, and thus the certainty of getting some payment for their labor when working on bad spots, and the extent to which their cause is supported is shown in the intimation of the International Federation that any attempt to export coal to British ports from the Continent would be prevented as far as was possible. At the same time the Transport Workers' Federation was prepared to refuse to handle any coal which might reach British ports from abroad.

Meantime the efforts of the Government to avert a deadlock have met with no success, and at the moment employees at practically all works are under notice to leave on varying dates extending as far ahead as the middle of March. Business is naturally at a complete standstill and general dislocation of trade is imminent.

An American Steel Company Seeking Business

It is understood that one of the leading independent steel companies in the United States is seeking business in this country in competition with the United States Steel Corporation, and is open to book contracts for both semi-finished and finished materials, including rails. A systematic attempt is to be made to get in touch with the leading British consumers of these, but of course the coal strike has upset a good many calculations, for temporarily nobody is inclined to make commitments. The position of the Welsh tin plate works is still a ticklish one as regards raw material, inasmuch as £5 10s has been paid for a few hundred tons of bars for prompt delivery. The German Syndicate is quoting £4 17s 6d, but this of course is for April-June shipment.

Home Rail Business for Home Works

The London County Council has been seriously debating whether it will be proper to purchase foreign rails in connection with the tramway service, and following the example of some other corporations during recent months has decided that the business should be placed with the Leeds Steel Works, regardless of the fact that a needless expenditure of thousands of pounds was involved in the transaction. For the moment there is not the slightest use in foreign firms soliciting business from the municipal authorities of this country, unless there is absolutely no other source of supply open.

A Shipbuilding Merger

An important amalgamation has taken place in the shipbuilding trade, showing the tendency in the control of all large industrial concerns to be toward consolidation. The London & Glasgow Shipbuilding Company's business has been acquired by Harland & Wolff, Ltd., of Belfast, that company paying £9 3s for each £9 fully paid-

up share. This action is important for the Clyde, for both parties have the highest reputation, and Belfast has been the birthplace of a fleet of ships of record-breaking size, while the reputation of the Clyde yard is known the world over.

There seems to be some little weakening in the position of certain classes of continental iron and steel, but this arises more from pressure of material in second hands than from any absolute deterioration in the position of producers.

Metal Market

NEW YORK, March 13, 1912.

The Week's Prices

Cents Per Pound for Early Delivery.							
Copper, New York.		Lead.		Spelter—			
Mar.	Lake.	Electro-lytic.	Tin, New York.	New York.	St. Louis.	New York.	St. Louis.
7.....	14.62½	14.50	42.55	4.00	3.92½	6.97½	6.82½
8.....	14.62½	14.50	42.45	4.00	3.92½	6.97½	6.82½
9.....	14.62½	14.50	.....	4.00	3.92½	7.00	6.85
11.....	14.62½	14.50	42.90	4.00	3.92½	7.00	6.85
12.....	14.62½	14.50	42.60	4.00	3.92½	7.10	6.95
13.....	14.62½	14.50	42.25	4.00	3.92½	7.15	7.00

Demands for copper have been light, with evidences of weakness, though quotations are unchanged. Tin has been irregular and is lower. Lead continues low and quiet. Spelter is higher and strong. Cookson's antimony has advanced.

New York

Copper.—There has not been any notable demand for copper in the last week; in fact, not enough to really test the strength of the market, which, however, shows evidences of weakness because of the labor troubles abroad. Should the coal strikes continue very much longer, this would curtail consumption among foreign consumers and there would be a consequent falling off in exports, followed by an increase in stocks here. The statement of the Copper Producers' Association for February, issued March 8, will be found elsewhere in this issue. Lake copper is quoted to-day at 14.62½c. and electrolytic at 14.50c. The London price for spot copper is £64 12s. 6d. and futures, £65 7s. 6d. The exports of copper this month have been 10,482 tons.

Pig Tin.—A very large business in tin was done last Thursday and Friday in all positions, from spot to June and July delivery. In these two days from 1200 to 1500 tons changed hands. Among the buyers were both dealers and consumers. The activity was caused largely by the offering of tin in New York by the agents of leaders in the foreign syndicate who sold several hundred tons. On March 7 tin sold for 42.55c. to 42.75c. and on March 8 from 42.45c. to 42.55c. Large consumers have made inquiries for delivery covering all the way from April to September and apparently are waiting for a substantial decline in price to come into the market. Tin is quoted to-day at 42.25c., showing a decline based on a falling off in early morning London cables. Spot tin is quoted in London at £190 and futures at £187. The arrivals of tin this month have been 1244 tons and there are afloat 1876 tons.

Tin Plates.—The market for tin plates in New York is unchanged, with \$3.54 asked for 100-lb. coke plates. The price of tin plates laid down at Swansea, Wales, remains at 13s. 6d.

Lead.—No material changes have occurred in the lead market since a week ago. The American Smelting & Refining Company continues its price of 4c., New York, and 3.92½c., St. Louis, and is taking the bulk of what business is being done. Conditions generally are quiet. Independent producers have taken some business at 4c., St. Louis.

Spelter.—The week has been an active one in spelter. While sales have been made at prices lower than have usually been quoted, it is asserted that these sales were really made for influencing the market and did not indicate the bona fide price of the metal. There can be no question as to the scarcity of spelter for prompt shipment and some of the trade assert that spot spelter, if it could be had, would bring 7.25c., New York. Quotations for April spelter are 6.90c. to 6.95c., St. Louis, with the prices for June, July and August ranging about 6.60c. to 6.65c. Early delivery is commanding 7c., St. Louis, and about 7.15c., New York. Large consumers are known to be in the market with inquiries. Among the conditions affecting the spelter market are car shortage, the weather and an advance in the price of the ore.

Antimony.—Cookson's antimony has advanced ¼c. and is now selling at 7.37½c., the price that is asked for Hallett's. Hungarian and Chinese grades are quoted at 6.80c.

Old Metals.—There is a fairly good market for old metals at the following selling prices:

	Cents per lb.
Copper, heavy and crucible.....	13.50 to 14.00
Copper, heavy and wire.....	13.25 to 13.50
Copper, light and bottoms.....	12.00 to 12.25
Brass, heavy.....	8.75 to 9.00
Brass, light.....	7.00 to 7.25
Heavy machine composition.....	11.00 to 11.25
Clean brass turnings.....	8.25 to 8.50
Composition turnings.....	9.50 to 10.00
Lead, heavy.....	3.75
Lead, tea.....	3.50
Zinc, scrap.....	5.25

Chicago

MARCH 12.—The copper situation presents a decidedly strong outlook and 16c. metal is being talked of. The spelter situation is almost acute, and even at the high and continually advancing price it is difficult to obtain any quantity. We quote as follows: Casting copper, 14.62½c.; Lake, 14.87½c., in carloads for prompt shipment; small lots, ¼c. to ¾c. higher; pig tin, carloads, 44c.; small lots, 46c.; lead, desilverized, 4c. to 4.05c., for 50-ton lots; corroding, 4.25c. to 4.30c. to 4.60c. for 50-ton lots; in carloads, 2½c. per 100 lb. higher; spelter, 6.90c. to 7c.; Cookson's antimony, 8.50c., and other grades, 7.50c. to 8c., in small lots; sheet zinc is \$8.50, f.o.b. La Salle or Peru, Ill., less 8 per cent. discount, in carloads of 600-lb. casks. Our old metals we quote buying prices for less than carload lots: Copper wire, crucible shapes, 12.12½c.; copper bottoms, 11.12½c.; copper clips, 11.87½c.; red brass, 11.12½c.; yellow brass, 8.75c.; lead pipe, 3.60c.; zinc, 4.50c.; pewter, No. 1, 26c.; tinfoil, 34c.; block tin pipe, 37c.

St. Louis

MARCH 11.—Stronger tendencies continue to prevail. For lead 4c. to 4.05c. is still firmly held, while spelter is up to 6.85c. to 6.90c. for spot, with futures ranging lower. These quotations are for Missouri brands. Tin is sharply higher today at 43.50c., while Lake copper is 14.85c. to 15.10c. Electrolytic copper is 14.72½c. to 15c. Cookson's antimony alone remains unchanged at 7.60c. In the Joplin district ore prices shot up for zinc blende to the highest prices known except for one short period in 1905. The top price for the week for 60 per cent. was \$55.50 per ton, the 1905 record being \$57. The highest price on the assay basis for the week was \$58, compared with \$60 paid in 1905. Local production has been cut to a minimum. Calamine sold for \$28 to \$30 per ton. Lead ore brought \$55. Miscellaneous scrap metals we quote as follows: Light brass, 5c.; heavy brass and light copper, 9c.; heavy copper and copper wire, 10c.; zinc, 6.50c.; lead, 3.50c.; pewter, 21c.; tin foil, 31c.; tea lead, 3c.

Iron and Industrial Stocks

NEW YORK, March 13, 1912.

The stock market has afforded general surprise by a strong upward movement in the face of what might be considered disturbing influences, such as the threatened coal strike and continued political turmoil. The range of prices on active iron and industrial stocks from Wednesday of last week to Tuesday of this week was as follows:

Allis-Chalm., com...	¾ - 1¾	Pressed Steel, com...	30 - 32½
Allis-Chalm., pref...	4¾ - 6¼	Pressed Steel, pref...	99 - 100¼
Baldwin Loco., com...	50¾ - 50¾	Railway Spring, com...	29 - 30
Baldwin Loco., pref...	103¾ - 104	Railway Spring, pref...	100 - 102
Beth. Steel, com...	28¾ - 30¾	Republic, com...	19 - 19¾
Beth. Steel, pref...	59¾ - 59¾	Republic, pref...	70 - 71¼
Can, com.....	11¾ - 14	Sloss, com.....	41¾ - 42
Can, pref.....	93¾ - 95¾	Pipe, com.....	14¾ - 14¾
Car & Fdry., com...	52¾ - 55¾	Pipe, pref.....	51½ - 51½
Car & Fdry., pref...	117¾ - 117¾	U. S. Steel, com...	62¾ - 65¾
Steel Foundries.....	28¾ - 29¾	U. S. Steel, pref...	108¾ - 110¾
Colorado Fuel.....	24¾ - 25¾	Westinghouse Elec.	73¾ - 74¾
General Electric.....	163¾ - 165¾	Va. I. C. & Coke.....	60 - 63
Gr. N. Ore Cert.....	37 - 38½	Am. Ship, com.....	47¾
Int. Harvester, com...	108¾ - 114¾	Chic. Pneu. Tool...	43 - 46
Int. Harvester, pref...	120 - 120¾	Cambria Steel.....	41¾ - 42
Int. Pump, com...	26¾ - 30¾	Lake Sup. Corp.....	28 - 29
Int. Pump, pref.....	81	Pa. Steel, pref.....	100¾
Locomotive, com...	34 - 36¼	Warwick.....	10¾ - 11
Locomotive, pref...	106½	Crucible Steel, com...	10¾ - 11
Nat. En. & St., com...	13 - 14¾	Crucible Steel, pref...	82 - 83
Pittsburgh St., pref...	101¾ - 102¾	Harb. Wk. Ref., pref...	100

Dividends Declared

The International Harvester Company, regular quarterly, 1¼ per cent. on the common stock, payable April 15.

The Crucible Steel Company of America, regular quarterly, 1¼ per cent., on the preferred stock, payable March 30.

Personal

Julian Kennedy, Pittsburgh, has been appointed consulting engineer for the Brier Hill Steel Company, Youngstown, Ohio, for the erection of its new open-hearth steel plant.

Howard Evans, vice-president of the J. W. Paxson Company, Philadelphia, Pa., left March 8 for a sojourn of several weeks at Pinehurst, N. C.

John Griffen, formerly superintendent of the Humbert works of the American Sheet & Tin Plate Company at South Connellsville, Pa., has been made superintendent of the La Belle Works of the same company at Wheeling, W. Va.

P. L. Frailey, formerly manager of publicity of the Empire Iron & Steel Company, Niles, Ohio, is now connected in a similar capacity with the Brier Hill Steel Company, Youngstown, Ohio.

Samuel Siddall has resigned as vice-president and treasurer of the Garry Iron & Steel Company, Niles, Ohio. J. Charles Wicks is president and manager of sales; George C. Johnston is secretary and H. G. Long is treasurer.

E. K. Morse, former president of the Engineers' Society of Western Pennsylvania, Pittsburgh, has gone to Panama to be absent about a month.

F. E. Guy has been appointed assistant Eastern sales manager of the Universal Portland Cement Company, with offices in the Frick Building, Pittsburgh.

A party of officials of the Brier Hill Steel Company, consisting of W. A. Thomas, president; E. L. Ford, chairman of the Advisory Committee; John Stambaugh, treasurer; R. C. Steese, vice-president and general manager, and B. R. Shover, superintendent of the proposed open-hearth plant, were in Middletown, Ohio, last week inspecting the open-hearth steel works and sheet mills of the American Rolling Mill Company at that place.

Charles A. Schieren, Jr., of the Charles A. Schieren Company, New York, returned March 9 from Europe after an absence of a little over six weeks, during which he visited London, Hamburg, Berlin and Liverpool. The principal branch of the Schieren company is at Hamburg, and while there Mr. Schieren consulted with the managers of other branches. Like other observers, Mr. Schieren found Germany and the Continent generally enjoying great commercial activity. He was in Manchester, England, March 1 and at that time the number of works which had shut down as a result of the then impending coal strike was very noticeable. "The sun was shining," he said, "which never happens when Manchester is busy." He found English manufacturers feeling quite gloomy over the outlook.

C. H. McCullough, Jr., vice-president of the Lackawanna Steel Company, who has been in England, will return about the end of March.

C. C. Owens has been placed in charge of the Detroit district sales office of the Westinghouse Electric & Mfg. Company with the title of district manager. He entered the employ of the company in 1896, taking the apprenticeship course for three years, after which he spent four years in the engineering department, specializing on switchboards and controllers. For the last eight years he has been connected with the New York sales office, having had charge of the industrial and power division for the past two years.

Prof. John L. Shearer, dean of the Ohio Mechanics Institute, and George McG. Morris, president of the J. B. Morris Machine Tool Company, Cincinnati, Ohio, sailed from New York for Europe March 9. They will land at Antwerp and spend about six weeks visiting various parts of the Continent.

Ambrose Swasey, of the Warner & Swasey Company, Cleveland, Ohio, sailed from New York March 7 on a pleasure trip which is to take in Panama and various South American ports.

The New York office of the Warner & Swasey Company, Cleveland, Ohio, is now in charge of Charles J. Stilwell, who has succeeded A. C. Cook as New York manager. Mr. Stilwell has been connected with the sales department of the company in Cleveland. Mr. Cook will

spend a few weeks in Cleveland and will then go abroad for a period of two years in the interests of the Warner & Swasey Company.

Frank L. Crobaugh, Bratenahl Building, Cleveland, Ohio, has disposed of that portion of his chemical business which consisted of the sampling and analyzing of iron ore in shipments for storage, for the purpose of adjustment between the buyer and seller, and will not hereafter have the organization for carrying on that class of business. He will continue, however, to operate as an analytical and metallurgical chemist.

H. C. Perrine, city sales manager for Joseph T. Ryerson & Son, Chicago, has resigned and expects to reside in Wyoming. He will be succeeded by William H. Dunham.

A. W. Foote, president and treasurer of the Foote-Burt Company, Cleveland, returned last week from a month's trip to the Panama Canal and some of the Central American countries.

Henry H. Quimby, formerly bridge engineer for the city of Philadelphia, has accepted the position of chief engineer with John G. Brown, Witherspoon Building, Philadelphia, Pa., designer and builder of factories, mills and warehouses. He will have charge of a large organization of architects and electrical, mechanical, heating and ventilating engineers. Mr. Quimby rose from the shipping department of the Phoenix Iron Company, Phoenixville, Pa., to chief engineer. Becoming bridge engineer for Philadelphia, he designed over 60 bridges for that city, many of which have become famous throughout the world.

Frank L. Brown, well known in the wire trade through his connection with the Washburn & Moen Mfg. Company, and later with the Pacific Steel & Wire Company, has sailed for Europe in the interest of San Francisco's Panama-Pacific Exposition.

Albert G. Lea, who for the past five years has been president of the Lea Equipment Company of New York and Philadelphia, has disposed of his interest in the company to Philadelphia parties and has resigned as president. He will not enter any active business for the present.

Crocker Brothers, 99 John street, New York, announce that W. B. Whittemore, formerly their salesman in the metropolitan district, will hereafter represent them in New England, with offices at 53 State street, Boston.

The Brown Specialty Machinery Company, 2440 West Twenty-second street, Chicago, will continue under the direct management of its treasurer, Elmer A. Rich, Jr., and there will be no change in its policies as a result of the death of its late president, Edwin F. Brown.

Obituary

GEORGE H. TURNER, Torrington, Conn., vice-president of the American Brass Company, died in Hahnemann Hospital, New York City, February 29, following an operation not expected to be serious. He was a native of Prince Edward Island and was about 45 years of age. Practically all of his business life was spent in the metal industry. He was first associated with the firm of Wallace & Sons, Ansonia, Conn. When the factory of this firm was purchased by the Coe Brass Company, in 1895, Mr. Turner became connected with that company, where he continued until seven years ago, when he removed to Torrington. He became a strong factor in the business and held successively the offices of assistant secretary and secretary of the Coe Brass Company, and was a vice-president of the American Brass Company since January 1, 1912, when the subordinate companies were taken over by the holding company. He was known as a man of unusual business sagacity, and his great ability and personal qualities were recognized and appreciated by the companies with which he was connected, as evidenced by the frequent promotions which were tendered to him. He leaves a widow.

JOSEPH C. FORD, president and treasurer of the Spring Lake Iron Company, Fruitport, Mich., died March 5 at the Butterworth Hospital, Grand Rapids, Mich., aged 61 years. He was also vice-president and secretary of the Mitchell-Diggins Iron Company, Cadillac, Mich. He had been prominent among the Michigan manufacturers of charcoal pig iron for 30 years.

Metal Trades Annual Meetings

The Worcester Branch

The Worcester Branch, National Metal Trades Association, Worcester, Mass., held its tenth annual meeting March 5. President Albert E. Newton being the chairman. The reports of the officers showed that the year has been a most prosperous one. Officers were elected as follows: President, John W. Harrington, Harrington & Richardson Arms Company; vice-president, Paul B. Morgan, Morgan Construction Company; treasurer, A. W. Beaman, Stockbridge Machine Company; secretary, Donald Tulloch. Executive board, Alonzo W. Whitcomb, Whitcomb-Blaisdell Machine Tool Company; H. B. McDonald, Simonds Mfg. Company, Fitchburg; Frank H. Orr, Dupaul Young Optical Company, Southbridge; Albert E. Newton, Prentice Bros. Company; George I. Alden, Norton Grinding Company; Charles W. Reed, F. E. Reed Company; W. B. McSkimmon, Union Twist Drill Company, Athol; Herbert L. Flather, Flather & Co., Inc., Nashua, N. H.; George H. Coates, Coates Clipper Mfg. Company; George F. Fuller, Wyman & Gordon Company.

The Worcester Branch held its annual reunion and banquet in Washburn and Mechanics' halls March 6. A reception preceded the dinner. Delegations were present from various other branches. The speakers were Gen. Hugh Bancroft, Boston; J. S. Murdoch, Providence, R. I.; a vice-president of the Grand Trunk Railroad, and City Solicitor E. H. Vaughan, who represented Mayor O'Connell of Worcester.

The Boston Branch

The Boston Branch, National Metal Trades Association, held its annual meeting and dinner at Young's Hotel, Boston, March 6, with an exceptionally large attendance. The reports of the officers showed a very prosperous year. The officers elected for the year were: President, H. I. Illingworth, Boston Machine Works Company, Lynn, Mass.; vice-president, Martin B. McLauthlin, Geo. T. McLauthlin Company, Boston; treasurer, D. D. Russell, James Russell Boiler Works, South Boston. Executive committee, to serve until 1914, Winslow Blanchard, Blanchard Machine Company, Cambridge; G. A. Webster, Star Brass Mfg. Company, Boston; and holding over are Fred F. Stockwell, Barbour-Stockwell Company, Cambridge, and W. S. Martin, Mead-Morrison Mfg. Company, Cambridge. The speaker of the evening was Charles R. Allen, agent of the Massachusetts State Board for the Promotion of Industrial Education, his topic being "State Aid to Industrial Schools."

The Cincinnati Branch

The annual meeting of the Cincinnati Branch, National Metal Trades Association, was held at the Business Men's Club, Cincinnati, on the evening of March 7. In addition to the local members present quite a number of guests from other cities partook of the banquet that was served in the dining room of the club. At the conclusion of the dinner Fred A. Geier, president Cincinnati Milling Machine Company, on behalf of the association, presented to former Secretary John M. Manley a very handsome silver service. In his presentation address Mr. Geier called particular attention to the eight years' excellent service rendered by Mr. Manley, and to the extreme reluctance on the part of all the members to accept his resignation to become civic secretary of the Cincinnati Business Men's Club. F. C. Caldwell, president H. W. Caldwell & Son Company, Chicago, and president National Metal Trades Association, spoke principally on industrial conditions on the Pacific coast, in which part of the country he has recently spent considerable time. He was followed by Henry D. Sharpe, Brown & Sharpe Mfg. Company, Providence, R. I., and Edwin E. Bartlett, Boston, both of whom made very interesting addresses.

The report of Assistant Secretary W. S. Dickson dealt principally with the bill now before Congress to remove the duty on machine tools and the menace to manufacturers that the eight-hour bill will prove, if passed. The following officers were re-elected to serve for the ensuing year: Henry Ritter, president; P. O. Geier, vice-president; E. Von Wyck, treasurer; George W. Krapp, secretary; William S. Dickson, assistant secretary, and J. C. Hobart,

G. McG. Morris and W. J. Friedlander members of the Executive Committee.

Among the out-of-town guests present were Nelson W. Dingwall, president Chicago Branch, National Metal Trades Association; M. Cokely, Lima, Ohio, and Alfred Marshall, Marshall & Huschart Machinery Company, Chicago.

The Cleveland Branch

The annual meeting of the Cleveland Branch, National Metal Trades Association, was held March 7. Departing from the usual custom of a banquet and evening meeting, a noonday luncheon was held in the library of the Cleveland Chamber of Commerce. After luncheon a business session was held. The retiring president, C. O. Bartlett, made a few remarks relating to the constitutional convention now in session in Columbus, Ohio, and the Ohio employees' liability and workmen's compensation law. He said that Ohio manufacturers ought to send 5000 men to Columbus to represent the interests of the manufacturers before the constitutional convention. The annual election of officers resulted as follows: President, C. B. Willson, vice-president Ferro Machine & Foundry Company; vice-president, James H. Foster, vice-president Hydraulic Pressed Steel Company; treasurer, Frederick Metcalf, treasurer Chase Machine Company. The following were elected to act with the president, vice-president and treasurer as the Executive Board: W. A. Comstock, Cleveland Wire Spring Company; J. C. Sparrow, National Safe & Lock Company; John Hertner, Raugh & Lang Carriage Company; George Canning, Cleveland City Forge & Iron Company, and George D. Cowley, Hill Clutch Company.

President-elect Willson, in the course of his remarks, stated that he hoped that during the year the members would conduct an efficiency campaign through the members of the Cleveland Superintendents' and Foremen's Club. He said that much can be accomplished by getting the foremen and superintendents interested and having them visit other factories in the city. He stated that manufacturers sometimes go to foreign cities to get new ideas and are referred right back to plants in their home cities for such ideas.

The report of the treasurer, James H. Foster, showed the organization to be in strong financial condition. Secretary Frankel, in his annual report, stated that during the year there had been no labor troubles in the metal trades industry in the city. He referred to the work accomplished by the Cleveland Branch during the year. A great amount of time had been consumed in following up the matter of employees' liability and workmen's compensation. In regard to the operation of this law, which went into effect March 1, he stated that an investigation made among the metal trade manufacturers of Cleveland showed that up to the present time only four of them contemplated insuring their men under the State law. A number of manufacturers had renewed their liability insurance with private companies, considering the rate of these companies lower than they would be required to pay if they sought the protection provided under the State compensation law.

An address on the provisions of this law was made by Homer H. McKeehan, attorney. He explained that a man who had elected to pay into the State insurance fund and to secure the protection provided was not exempt from liability for damages for injuries if he did not comply with the State and municipal laws relating to the protection of workmen and if he did not comply with the order of a duly authorized agent. He also called attention to various points of the existing Ohio statutes relating to safety devices and the protection of employees, stating that many of these provisions were not explicit, but that in case of suit for damages it devolved on a jury to decide whether a manufacturer had complied with the provisions of the law.

The Detroit Steel Products Company, Detroit, Mich., has received a large Government contract for Fenestra windows, to go into all of the shop buildings of the large new naval station at Pearl Harbor, Hawaii. This contract includes 50,000 sq. ft. of steel windows, and is an indication of how steel supplants wood in a manner not thought of a few years back. The Navy Department has used Fenestra windows in many of its new shop buildings, and it has become a standard specification for much Government work.

Pittsburgh and Vicinity Business Notes

Joseph T. Castle, manufacturer's agent, Arrott Building, Pittsburgh, has sold a 150 hp. Buckeye gas engine to be direct connected to a 100 kw. Allis-Chalmers generator, for installation in the Penn Building, Pittsburgh; two 300 hp. Keeler water-tube boilers, to the McGregor Coal Company, West Virginia; two 200 hp. Keeler water-tube boilers, to the American Water Works & Guarantee Company, Argento, Ark.

Shimer & Co., Philadelphia, with offices in the Oliver Building, Pittsburgh, have taken the sales agency for the Vulcan Charcoal, Iron & Steel Company, Crum Lynne, Pa. The company manufactures charcoal iron in bars and billets by the J. Jones Hudson process, by which, it is claimed, the equivalent of Swedish charcoal bar iron can be produced with absolute control of analysis.

J. H. Wheelhouse, Pittsburgh representative of the Hooven, Owens, Rentschler Company, of Hamilton, Ohio, manufacturer of the Hamilton-Corliss engine, has moved his offices from the Frick Building to room 617, Oliver Building.

T. J. McGraw, Jr., Pittsburgh manager for the Erie City Iron Works, Erie, Pa., has sold four 300 hp. water-tube boilers and four 4-valve engines to the Atlas Coal Company, Oliver Building, Pittsburgh.

The Pittsburgh office of the Babcock & Wilcox Company, Farmers' Bank Building, has received an order from the Aluminum Company of America for two 635 hp. boilers to be installed in its power plant at East St. Louis, Ill.

On April 1 the general offices of the Aluminum Company of America will be removed from New Kensington, Pa., to the Oliver Building, Pittsburgh.

The Pittsburgh office of the Southwark Foundry & Machine Company, Philadelphia, has received an order from J. C. Cromwell, New England Building, Cleveland, Ohio, for four cross-compound steeple blowing engines for the new blast furnaces to be erected by the Pittsburgh Steel Company at Monessen, Pa.

The report that the American Steel Foundries is building an electric furnace at its plant at Sharon, Pa., is officially denied. The company has no improvements or additions under way at present.

The Wheeling Mold & Foundry Company, Wheeling, W. Va., is building an addition to its plant to be 300 x 400 ft. The foundry and machine shops are operating to practically full capacity and the company is making large shipments of material to the Panama Canal.

The Midland Steel Company, Midland, Pa., has served notice on the holders of its pig iron warrants that, commencing April 1, a storage charge of 2½ cents per ton per month will be made. The warrants did not call for any storage charge nor set any date at which the iron is to be shipped. The Pittsburgh Crucible Steel Company, which took over the Midland Steel Company, desires the ground on which the pig iron is stored for its new open-hearth works, now under construction.

Proposed La Belle-Phillips Consolidation

A project is under way to consolidate the La Belle Iron Works, Steubenville, Ohio, and the Phillips Sheet & Tin Plate Company, operating sheet and tin plate mills at Clarksburg and Weirton, W. Va., and Steubenville. The latter company is a very large consumer of sheet and tin bars and has no steel works. The La Belle Iron Works is a large manufacturer of open-hearth steel and is also a producer of open-hearth sheet and tin bars. A consolidation of the two interests would therefore probably be to the advantage of both. A meeting of officers and directors of the two companies was held in the Duquesne Club, Pittsburgh, on Tuesday, March 12, at which the project was discussed, but nothing definite was accomplished. Another meeting will be held in a short time and it appears probable that a plan for the consolidation will be agreed upon.

Inland Steel Company's Extensions

The improvements contemplated at the Indiana Harbor, Ind., plant of the Inland Steel Company include four additional 60-ton stationary open-hearth furnaces, increasing the capacity 50 per cent, and a 90-in. three-high plate mill. Work is to commence as soon as possible.

The American Steel Foundries

Statement for 17 Months, Ended December 31, 1911

The American Steel Foundries changed its fiscal year in 1910 to end with the calendar year instead of on July 31, and for this reason the report just submitted to stockholders covers the 17-month period from August 1, 1910, to December 31, 1911. Following is the general profit and loss account for this period:

Earnings from operations of plants and net income of subsidiary companies (after deducting manufacturing, selling, administrative, head and district office expenses and before deducting depreciation).....	\$697,610.53
Other income—Interest, discount, etc.....	59,492.75
Total income	\$757,103.28
Deduct:	
Interest on borrowed money.....	\$2,587.50
Interest on debentures.....	194,752.00
Interest on bonds.....	329,091.66
Bond sinking fund installment and profits.....	157,066.84
Depreciation of buildings, plant and equipment (all properties).....	332,636.20
	\$1,016,134.20
Balance—net loss.....	\$259,030.92

The balance sheet as of December 31, 1911, is as follows:

Assets.	
Plants, buildings, machinery, patents, etc.....	\$20,794,781.99
Real estate not used for business.....	298,630.15
Sinking fund, cash and accrued interest.....	298,759.24
Miscellaneous securities.....	251,539.50
Inventories.....	2,275,334.94
Accounts and bills receivable (less reserves).....	1,963,483.03
Cash.....	306,669.85
Insurance premiums, etc., prepaid.....	31,589.13
Total	\$26,220,787.83
Liabilities.	
Capital stock.....	\$17,184,000.00
Bonds and debentures.....	6,338,200.00
Notes payable.....	200,000.00
Accounts payable.....	457,331.24
Payroll accrued.....	122,376.41
Accrued interest on bonds and debentures.....	113,496.66
Depreciation, renewal and other reserves.....	1,294,979.31
Bond sinking fund (appropriated from profits).....	734,922.92
Less—deficit in profit and loss account.....	224,518.71
Total	\$26,220,787.83

The following extracts are taken from the accompanying remarks by President William V. Kelley:

The gross sales for the 17 months were \$14,300,562.01, or at the rate of \$10,094,514.36 per year, as compared with \$17,173,740.98 for the preceding year. The actual earnings of this company for the period under report, after ordinary deductions and provisions, were \$85,452.42, but from these there has been deducted and covered into the bond sinking fund \$240,980.98 in accordance with the indenture securing the bonds. There has also been deducted the sum of \$103,502.36 to bring our inventory of raw materials down to the extremely low market prices obtaining December 31. The above deductions far more than offset the apparent loss shown in the statement.

In arriving at the result of the 17 months' operations as shown by the profit and loss statement, all manufacturing, selling, administration, head and district office expenses have been deducted as well as all interest and other charges including \$1,239,241.06 for repairs and maintenance and \$332,636.20 for depreciation of fixed properties. The provision for depreciation of fixed properties is adequate, and of the amount set aside only \$201,530.68 has been spent in replacements and for minor additions and improvements, leaving in the company's funds the balance of \$131,105.52 unspent and available for future renewals.

By far the largest portion of the business of this company originates from the building of railroad cars and locomotives; therefore its operations and output closely follow activity in those lines. During the period under report accepted authorities give the ratio of car building as less than 60 per cent. of those built during our preceding year and only one-third of those during the calendar year 1907. The result of the lack of buying by railroads and generally depressed business conditions was that the steel casting plants of this company were only able to operate an average of 50 per cent. of their capacity during the entire period of 17 months' and during six of the months at 40 per cent. or less, one month dropping to 32 per cent.

An opportunity occurring to purchase control (nearly the entire capital stock) of the Continental Railway Equipment Company, which seemed likely to furnish this company with a large tonnage at profitable prices as well as to be profitable of itself, the stock was bought and the purchase price is included in our property charges.

Effective July 1, 1910, the company commenced carrying its own employer's liability insurance, with the result that a large saving has been made and our workmen in case of accident receive more than they did under the former arrangement. A casualty department along definite lines has been added and an employee's benefit association been established at small expense to the company, with the total result that accident suits are almost unknown, the company is saving money, our employees faring better than before, and greater good feeling and efficiency have been established.

Orders on hand are larger than at any time since the beginning of the period covered by this report, but prices like those in other lines of steel manufacture are unsatisfactory. It is hoped, however, that a liberal buying movement will both improve prices and increase our output.

The Wear of Steel Wheels

Commenting on the specification for solid steel wheels reported at the last meeting of the American Society for Testing Materials and on which a revised report is to be made at this year's meeting, the Railway Age Gazette says:

"The limits for chemical composition [in the specification] are rather wide, allowing carbon 0.60 to 0.85 per cent.; manganese 0.50 to 0.80 per cent., and phosphorus and sulphur as high as 0.06 per cent. It was explained that these limits were made to admit either basic or acid open hearth steel, but there are objections to such a wide variation in the elements which affect the hardness and wear of wheels. Steel wheel records must take account of the two wheels on one axle, as it is desirable to have wheel mates as near the same hardness as possible, since the service of the softer wheel will determine the time when the pair must be removed for turning. If a 0.60 per cent. carbon wheel is mated with one containing 0.80 or 0.85 per cent., after about 10,000 miles service the soft wheel will show wear in the throat. This production of a sharp flange on the softer wheel will cause the harder wheel to crowd it to the rail, and in time the flange on the soft wheel will reach the prescribed limit for wear and require the removal of the pair for re-turning before the hard wheel has shown much wear.

"Some of the larger roads require the carbon content to be stamped on the wheel, and the two wheels on one axle are so mated that the carbon does not differ more than 0.05 per cent.; but it is probable that the carbon in different parts of the same wheel varies more than that amount. While it may be possible for manufacturers to furnish fairly accurate records of carbon for individual passenger and engine truck wheels, it is not to be expected that this will be forthcoming for freight car wheels, which will be ordered in as large lots as from 5000 to 10,000. On account of the importance of mating wheels which are similar in hardness, and the wide range allowed by the proposed specification, the subject was referred back to the committee for a revised report."

The Fram and Its Diesel Engine

The attainment by Amundsen of the South Pole is regarded with special interest in St. Louis, Mo., because his ship, the Fram, is propelled by a type of Diesel engine, the building of which is controlled in America exclusively by a St. Louis corporation, the Busch-Sulzer Bros.-Diesel Engine Company, of which Adolphus Busch is president. Captain Amundsen selected the Diesel engine because the capacity of his ship was limited. The Diesel engine uses crude oil as fuel, and with this engine he was able to make a voyage four or five times as long as he could have made with an equal weight of coal. The Busch-Sulzer Bros.-Diesel Engine Company is now considering the erection of a manufacturing plant for Diesel engines in St. Louis. Mr. Busch about 15 years ago bought the Diesel patents and has spent large sums in the development of the engine.

A Large Allis-Chalmers Pump Contract

The Pittsburgh office of the Allis-Chalmers Company has closed a contract with the Pittsburgh Steel Company for use at its works at Monessen, Pa., for four 15,000,000-gal. vertical, cross-compounded, self-contained crank and fly-wheel pumping engines. These pumps are to be duplicates of a unit built several years ago by the Allis-Chalmers Company for the Pittsburgh Steel Company, and will be installed in the same power house, making a pumping plant of five units. The contract was thus placed because of the excellent service, efficiency, and reliability of the pump now running. Each pump is entirely self-contained and will operate against a total head, including suction, of about 150 ft. The high-pressure cylinders are each 20 in. in diameter, and the low pressure cylinders 42 in., each with 36-in. stroke of piston. In the design of these pumps graceful lines have not been lost sight of. When the installation of the five units is completed, the Pittsburgh Steel Company is confident that it will have one of the finest pumping plants in the country.

Hard Steel Bar Association

An organization known as the Rail Steel Bar Manufacturers' Association has been formed by a number of mills rolling hard steel bars from old rails. The association is analogous to the Association of American Steel Manufacturers, among the makers of soft steel, and its purpose in particular is to promote greater publicity regarding the merits of hard steel, especially for reinforcing bars. The work of the association will be largely educational. The following officers were elected: President, E. E. Hughes, Franklin, Pa.; vice-president, J. G. Joseph, Buffalo; secretary and treasurer, A. S. Hook, Chicago. The first meeting was held at the La Salle Hotel, Chicago, March 9.

In a course on Business Efficiency, at West Side Young Men's Christian Association, Fifty-seventh street and Eighth avenue, New York City, twenty efficiency experts, who have had wide experience in this line, are to lecture. The class is to meet every Friday evening for 10 weeks commencing March 22. There will be two lectures each night. Among the lectures are: "How Studebakers Found the Application of Efficiency Principles Worth a Million Dollars," by Col. Charles Arthur Carlisle, executive board, Studebaker Corporation, South Bend, Ind.; "Efficiency in Purchasing," by William V. S. Thorne, purchasing agent, Harriman Lines; "Accurate Cost Knowledge—the Cornerstone of Efficiency," by Gershom Smith, formerly auditor of the Carnegie Steel Company, and "Getting Rid of Useless Work," by W. A. McFadden, efficiency engineer.

The Jeffrey Mfg. Company, Columbus, Ohio, has for a long time been furnishing equipment for the storage and re-handling of coal, both bituminous and anthracite. The probability of strikes in the coal fields is directing the attention of large industries to the desirability of securing adequate facilities of this character. It is estimated by the company that the equipment which it is at present figuring on with a number of large consumers will handle coal at a labor cost of approximately one cent per ton. This is not only an exceedingly low cost of operation, but the original first cost of the equipment is claimed to be lower than that of similar apparatus heretofore installed.

Committees representing the various classes of securities of the Allis-Chalmers Company held a joint meeting in New York City on Tuesday to ratify the plan of reorganization which had been worked out at informal conferences. The plan calls for an assessment of \$20 a share on the preferred stock and \$10 a share on the common stock, which would bring about \$5,192,000 into the treasury. The bonds are to be retired in exchange for preferred stock in the new company, thus eliminating the fixed charge which brought about the present crisis in the company's affairs.

The freight department of the American Steel & Wire Company, Pittsburgh, has issued supplement No. 2 to schedule No. 16, showing through freight rates on nails, wire, woven wire fencing, horseshoes, iron and steel bars, plates, structural steel, etc., from Pittsburgh to practically all towns in the United States and Canada.

ALLIS-CHALMERS & SONS,
Mechanical and Civil Engineers,
PITTSBURGH, PA.

New Tools and Appliances

This is essentially a news department for which information is invited.

A New Ratchet Tap Wrench.—The Albert Tool Company, 4731 North Mascher street, Philadelphia, Pa., is manufacturing a new ratchet tap wrench in which it is possible to make the tool either a right or left hand ratchet tap wrench at the will of the operator. If desired the cross bar can be removed and a single ended lever inserted in its stead for working in confined spaces. Several sizes of wrench ranging in sizes from $\frac{1}{8}$ to $\frac{3}{4}$ in. are made. A compression spring normally holds the shank of the wrench and the sleeve in such a position that the teeth in each are engaged.

Automatic Locking Foot Treadle.—Hardinge Bros., 3133 Lincoln avenue, Chicago, Ill., are manufacturing an automatic locking foot treadle for one, two and three speed counter shafts for all small belt-driven machines requiring a treadle shifter. A downward movement of the treadle, which operates a bell crank lever that is connected with the counter shaft by a wire, shifts the belt to the tight pulley, and after the treadle is pressed it is locked by the upward pull of the wire. For stopping the lathe it is simply necessary to press down on the heel part of the lever, which unlocks the treadle.

Portable Electric Reamer and Drill.—An improved design of electrically driven portable drilling and reaming machine is being made by the Cincinnati Electrical Tool Company, Cincinnati, Ohio. Although the tool weighs only 27 lb., it has a capacity for reaming $\frac{1}{2}$ -in. holes and for drilling holes in steel up to $\frac{3}{4}$ in. in diameter. A series-wound motor with the armature mounted on ball bearings supplies the necessary power for driving the drill. The gears, which are of hardened steel, are inclosed and run in grease. Like the various other motor-driven tools of this company the motor controlling switch is operated by a sliding sleeve on the handle.

High Speed Drilling Machine.—A line of high speed, ball bearing drilling machines, with any number of spindles from one to six, inclusive, is being built by the Guarantee Machine Company, Grand Rapids, Mich. Two sets of adjustable ball bearings are used in the cone pulleys driving the spindles, which are also provided with ball thrust bearings. The idler pulleys on this machine are arranged to rise simultaneously so that the belts are kept in line with the proper step of the cone pulley. In changing the spindle speed all the adjustment that is necessary is to raise the idler pulley, the idler bracket being arranged to permit the idlers to track on either cone without any adjustment on the part of the operator. Four speed changes, ranging from 450 to 4500 r. p. m., with a counter shaft speed of 600 r. p. m., are available, and are secured by a conveniently located lever. An adjusting screw and hand wheel located at the front of each head is provided for the idler carriage to take up the stretch of the $1\frac{1}{2}$ -in. endless belt when necessary. The spindles have a feed of 6 in. and are driven by two splined keys. The vertical movement of the sliding head is 8 in.

Horizontal Drilling, Boring and Facing Machine.—The latest design of horizontal drilling, boring and facing machine, built by the Rockford Drilling Machine Company, Rockford, Ill., equipped with a direct motor drive, the motor being mounted on an extension on the machine base. In this way a complete unit is formed which possesses the advantage of being able to be picked up by a crane and carried to any part of the shop where it might be required. The motor is of the direct-current adjustable-speed type and drives through gearing. Two sliding gears on the main horizontal driving shaft can be engaged with intermediate pinions that connect with the driving pinion of the motor, thus giving a ratio of 5 to 1. In addition to this positive geared drive, the machine has a positive geared feed ranging from 0.005 to 0.06 in. per revolution of the spindle. The amount of feed for any position of the change gears is shown by a pointer and index plate, and the changes are made by handles conveniently located on the saddle. An automatic trip, which operates at any point within the full travel of the spindle sleeve without the use of trip dogs on the sleeve disengages the feed. The spindle has a vertical travel on the column of 18 in. and the column has a maximum lateral movement of either 12, 24 or 36 in., the distance being varied to suit individual requirements.

Universal Tool Holder.—A tool holder which is so made that it will fit any lathe and can be swung in any angle, and will permit any one of the six tools supported by it to be set at the proper height and right or left-hand cuts to be taken easily, is being made by Ernest Stoecklin, Ridgefield Park, N. J. The tool block is split and the webs between the holes for the tools are cut through so that they can be clamped easily and solidly, while still enough spring is provided to prevent sticking. There is a circular groove entirely around the middle of the tool block, into which the clamping bolt fits and prevents it from slipping out of the clamp. The arrangement of tools accommodated by the holder are $\frac{1}{4}$ and 1-in. bars for holding inserted cutters at each end, and $\frac{1}{4}$, $\frac{3}{8}$, $\frac{1}{2}$ and $\frac{5}{8}$ -in. drill rods. All of these are 12 in. long, and as the drill rods are also doubleended 12 tools are thus available.

Portable Drill.—A new type of portable drill known as the One Man machine has been recently placed on the market by the Independent Pneumatic Tool Company, Thor Building, Chicago, Ill. This tool is equipped with compound planetary gears and is particularly adapted for drilling, tapping and screwing in stay-bolts and studs of all sizes up to $1\frac{1}{4}$ in. The special name, One Man, has been given to the new tool from the fact that heretofore two and sometimes three men have been needed to lift and balance a portable machine possessing sufficient capacity to perform this work. The weight of the new tool is only 20 lb., so that one man can easily handle it. The socket of the drill is fitted with a No. 3 Morse taper and in common with all the drills of this company the valves are of the Corliss type.

Collapsible Tap.—For accurately threading iron, brass and steel goods and especially for threading close to internal shoulders, the Manufacturer's Equipment Company, Chicago, Ill., has brought out a collapsible tap. With it it is possible to tap work as small as $15/32$ in. in diameter with 20 threads per inch with the smallest tap. Adjustments for diameter and depth to be tapped are provided and the construction of the tap also permits grinding on the end of the chasers from $\frac{3}{8}$ to 1 in. or more, according to the size of the tap. The tap proper is made up of a number of chasers in the form of round bars in engagement with each other and having rolling contact on each other. This arrangement it is pointed out insures rigidity throughout the length of the tap as the several bars are mutually supported. When threading material requiring no lubrication during the machining operation, the fine dust accumulating from the friction between the chasers and the work is automatically brushed off between the chasers by their rolling action. The chasers and the rolling collar are held in place by an adjustable steel block engaging with a notch on the face of the collar. When the desired depth is reached the tripping cup, which has pins reaching through the tap body, releases the collar by being forced against it and causes the chasers to collapse. The tap is made in ten sizes ranging from $15/32$ to $2\frac{1}{2}$ in. Provision is made for varying the amount of collapse.

Nut Lock.—A recent development of the United Nut Lock Company, Springfield, Mass., is a new type of nut lock. The tongues project into the "center" engaging the bolt threads on opposite sides, thus combining a wedge and ratchet action in the bolt thread on the top of the nut.

At the annual meeting of the stockholders of the Sloss-Sheffield Steel & Iron Company, held in Jersey City March 13, A. E. Ames of Toronto, Canada, was elected a director to succeed H. O. Seixas, deceased. Mr. Ames is a director of the Twin City Rapid Transit Company and the Duluth Superior Traction Company. The retiring directors were re-elected, after which the board met for reorganization and re-elected the old officers, including John C. Maben, president. Mr. Maben will hereafter make his headquarters in New York, going to Birmingham, Ala., at frequent intervals.

Plans for the reorganization of the Massillon Iron & Steel Company, Massillon, Ohio, which have been under way for some time, have resulted in the organization of a new company under the name of the Massillon Pipe & Foundry Company. The new company has a nominal capitalization of \$10,000, but it is understood that this will shortly be increased to \$1,500,000.

The Machinery Markets

Indications continue to be of a healthy character with a great deal more business in prospect than has been transacted within the week. Trade in the manufacturing centers is fair generally. New York has some excellent prospects which are expected to compensate for a rather quiet week. The average of business in New England within the last week was better than during the corresponding time a year ago and the wire industry in particular is active. Philadelphia has had some activity in power plant propositions, but trade is quiet there. Cleveland conditions are better and some good orders have been placed. Cincinnati has had good inquiries for export, with domestic demands quiet. Columbus also has had good export trade and an improvement in other lines. In Detroit there has been a good aggregate of small orders. There has been more activity in Chicago and practically all of its shops are operating on full time. St. Louis is a little slack. The South, including Texas, is busy with power equipment in most demand, and Texas has a good call for electrical equipment. On the Pacific coast the demand for pumping machinery is unprecedented, although in other lines there seems to be a better call for second hand machinery than there is for new.

New York

NEW YORK, March 13, 1912.

The most conspicuous feature of the New York machinery market continues to be requirements on which action is pending. There has been within the week a continuance of sales made here and there of one or two tools, sales of single tools predominating and made only after close figuring. Purchasing agents are very slow in closing. Bids for the requirements of the Jersey City Technical High School were opened on the evening of March 7 and the tabulation of the large number of proposals began. Within a short time further requirements of the school will be announced and bids requested. Manufacturers of wood working machinery are fairly busy and subway and aqueduct work in the city is creating a demand for machinery used in such work.

Machinery men are regarding with interest the organization of the International Type Setting Company of New York, which is announced as a competitor of the Mergenthaler Linotype Company. The formation of the new company is based on the ground that all basic patents on the linotype machine have expired or will expire before November, 1912. Herman Ridder, publisher of the New York Staats Zeitung, and prominent in political and publishing circles, is the president of the company, which has been incorporated with a capitalization of \$4,000,000. Literature issued by the promoters states that the latest tools and appliances for economical manufacturing will be secured, and the trade already has received inquiries. The company intends to manufacture machines which are said to be equivalent to the Mergenthaler; also a type casting machine known as the Amalgatype, suitable for weekly newspapers and jobbing printing offices; develop and introduce in due time a machine known as the monoline composing machine and to manufacture supplies for the linotype generally. Plans are ready for the erection of a large three-story concrete building near the foot of Montague street, Brooklyn, N. Y., running from Furman street to the East River. A large warehouse now on the site is being demolished. The company expects to have its factory ready for occupancy by June. A force of 700 workmen are to be employed in the shops. Among those engaged in the mechanical end of the new company are W. S. Scudder, who has been associated for 25 years with the type setting machine business; W. H. Orpen, who was with the Mergenthaler Company for 17 years and will have charge of the construction of the machines, and Benjamin F. Soper, who will have charge of the matrix department, having had 20 years' experience in that work. Joseph Ridder is business manager of the new company, which has temporary offices at 83 Washington street, Brooklyn.

Rud. Chillingworth, who has large works at Nuremberg, Germany, has bought the factory of the Chicago Railway Equipment Company, located on West Side avenue, Jersey City, adjoining the property of the Eastern Carbon Works. The sale was made through Albert D. Ashforth, dealer in real estate at 10 East Thirty-third street, New York, and includes machinery and other equipment in the plant. The German firm will make a specialty of the manufacture of a new type of casing for differential gears for automobiles, and is said to be assured of large orders for its product. Extensive improvements will be made to the plant and adjoining land has been bought to allow of extensions. The business is one which is said to have been confined to Germany heretofore. Special machinery to the

value of many thousands of dollars was brought to this country for the new enterprise.

The Safety Car Heating & Lighting Company, Jersey City, N. J., has awarded a contract to the Turner Construction Company, 11 Broadway, New York, for the erection of a factory building at Twelfth street, Jersey City. The building will be 100 x 100 ft., five stories, of brick and concrete construction, and will be completed in about four months.

The Oxweld Acetylene Company, Newark, N. J., a new corporation, has acquired a site on Frelinghuysen avenue and is having plans prepared for a manufacturing building, 60 x 400 ft. A building, 50 x 100 ft., is also being considered. Both structures are to be of reinforced concrete and are estimated to cost about \$150,000. The incorporators of the company are Chicago residents, but details can be had of Feist & Feist, 736 Broad street, Newark.

The Hauck Mfg. Company, Brooklyn, N. Y., maker of oil burning appliances, suffered a loss by fire March 5 to its plant at 140 Livingston street. The company states that the damage was confined to the office and that its manufacturing facilities are not impaired. There will be no delay in the handling of its business.

The Evans Mfg. Company, Hammond, N. Y., which is rebuilding its plant for the manufacture of farming implements, recently destroyed by fire, will require new lathes, bolt threading machines, drill presses, etc. No new power equipment will be needed.

Plans for a municipal water works system at Wolcott, N. Y., are being prepared by Charles C. Hopkins, engineer, Cutler Building, Rochester. The estimated cost is \$35,000.

As soon as plans are approved by the State Board of Health bids will be asked for a filtration pumping station of 40,000,000 gal. per day capacity, to be erected at Nepperham Valley, near Yonkers, N. Y. The pumping building will be 75 x 150 ft., one story, of brick and concrete construction. The work will include three dams, two reservoirs of 900 acres and eight acres of covered masonry filters; also 31 miles of twin steel pipes. The total estimated cost is about \$9,000,000. Hazen & Whipple, 103 Park avenue, New York City, are the consulting engineers.

The Olean Electric Light & Power Company, Olean, N. Y., is negotiating with the city for a 10-year lighting contract. If secured it will expend about \$250,000 for new equipment.

The installation of a water softening plant is under consideration by the city of Oneida, N. Y., at an estimated cost of \$25,000. John Maxwell is chairman of the Water Committee. The Jamestown Street Railway Company is having plans prepared for extensive additions to be made to its car shops and storage barns on West Third street. The new buildings will be fireproof, and in them will be centralized the shops of the Jamestown Street Railway and the Chautauqua Traction Company.

New England

BOSTON, Mass., March 12, 1912.

Some promising inquiries and the knowledge of several good lists soon to be sent out, coupled with no decrease in current buying, constitute encouraging features of the machinery trade. Were business steadier, that is to say, were all weeks up to the average of the high ones, conditions would be most favorable. But such is not the case. Spurts of almost spirited buying are interspersed with periods of lagging demand.

Reports received from a large number of hardware manufacturers of New England indicate that the average of business is considerably better than last year. Some of them take a less favorable view of conditions than do others, but as a whole the feeling is that the year should be at least moderately prosperous. The wire industry, usually a reliable barometer, is flourishing. Last year was a good one and this year the volume is even greater, though prices are low.

The Waterville Corporation, Waterbury, Conn., will erect a factory building 120 x 300 ft., one story. This is one of the Chase properties and takes the product of the Chase Rolling Mill Company. The new building is intended to take care of the natural growth of the business. The new site at Waterville was chosen, instead of adding to the present works.

At the annual meeting of the Gilbert & Barker Mfg. Company, Springfield, Mass., W. T. Raymer was promoted from assistant treasurer to treasurer and W. H. Wood was made assistant treasurer. Robert H. McNall, New York, who was chosen president at a special meeting held the first of the year, was re-elected, as was also Charles C. Ramsdell, the vice-president. Mr. McNall succeeded J. F. Barker. The company expects to occupy its new factory in about two months and will continue its present lines with special attention to the pump and tank department; the furnace department and the gas machine department.

The Heald Machine Company, Worcester, Mass., had a most successful dedication of its new shop building March 7. A large number of visitors inspected the handsome, well-equipped building during the day, and in the evening the employees and their families were entertained.

The New York, New Haven & Hartford Railroad will spend \$7,000,000 for improvements on its Berkshire division, between Danbury, Conn., and Pittsfield, Mass. This entire section will be double tracked. Large purchases of land on the division between New Milford and Merwinsville are said to be in connection with a large hydro-electric development on the Housatonic River.

The Rhode Island Power Transmission Company has asked the Rhode Island Legislature for a charter authorizing it to furnish electricity for lighting, heating and power in that State. The capital stock named is \$500,000. The list of incorporators is a strong one, comprising Jonathan Chace, Walter Callender, Malcolm G. Chace, John O. Ames, Henry I. Harriman, Phillip Young, Herbert F. Hinckley and Frank Hinckley. This is understood to be a part of a general power project embracing the Blackstone Valley in Massachusetts and Rhode Island.

The Bosch Magneto Company is contemplating removing its plant from Springfield, Mass., to Bloomfield, N. J. The company, which recently erected a great modern factory at Brightwood, has had a great deal of trouble because of odors from rendering plants in the neighborhood, and asserts that unless the nuisance is abated the site will be abandoned. The Simms Magneto Company's factory at Bloomfield is being considered as the alternative location.

The Twin Blade Safety Razor Company proposes to move its factory from Waltham, Mass., to New Haven, Conn. The offices have already been transferred from Providence, R. I., to New Haven.

The Wallingford Company, Wallingford, Conn., has let the contract for an addition, 36 x 156 ft., four stories.

The New London Ship & Engine Company, Groton, Conn., will build two large additions immediately. At the north end of the plant will be constructed a building 108 x 130 ft., and at the south end a similar addition 108 x 130 ft. Both will be two stories, of brick and steel.

The agitation in Massachusetts for the admittance of the Grand Trunk System to Boston, Worcester and other points has assumed great force. Business men everywhere are urging the encouragement of a railroad system which probably could not be united with existing railroads to continue what is practically a monopoly. The New York, New Haven & Hartford and Boston & Maine systems are now under one control, and their relations to the Boston & Albany division of the New York Central are much closer than they used to be. The Grand Trunk would give important freight advantages to western points, the differential of its long haul being favorable to New England shippers.

The rising prices of Connecticut industrial stocks indicate an increasing business of the various companies. The 8 per cent. stock of the Stanley Rule & Level Company, New Britain, Conn., advanced 25 points in February to 325, and that of the Pratt &

Cady Company, Hartford, 22 points to 92. The Johns Pratt Company, Hartford, went up 11 points to 236, the Pope Mfg. Company preferred has risen close to 10 points since the first of the year, and the Smyth Mfg. Company, seven points. The International Silver Company has gained 6½ points to 112½. The New Britain Machine Company, New Britain, is up two points, and the American Brass Company, Waterbury, and W. & B. Douglass, Middletown, one point each. In a few cases there is a slight falling off, but the tendency is notably upward.

Philadelphia

PHILADELPHIA, Pa., March 12, 1912.

There is still that lack of energy shown in the machine tool trade which usually characterizes even fairly good business conditions. Developments in connection with tool buying move slowly and transactions are still confined largely to single tool propositions, with no improvement shown in the aggregate volume. Prices are generally reported of an unsatisfactory nature, with concessions being made in a number of instances. There has been a little more inquiry, but the demand has been largely for specialties. Several new crane propositions have recently come out. Some merchants as well as manufacturers are figuring on the requirements of the Norfolk & Western Railroad, but no important new inquiries have come from local railroads. Several lists of tools are anticipated. Little has been reported done in connection with the equipment required for the new plant of the Ottomobile Company at Mt. Holly, while a list is being prepared in connection with the tools required for the new machine shop for the C. H. Wheeler Mfg. Company, previously reported. Several fair power plants are under negotiation, but buying receptly has been somewhat restricted. The outlook, however, is reported more encouraging.

A fair business in second hand tools and machinery is reported, the demand being for the better grades and modern types of equipment. The local locomotive builder is taking on a better volume of business, although not of a character sufficient as yet to have any effect on its restricted operations. Casting plants have in a few instances taken on a slightly better run of orders, but operations have not materially increased.

The Bergdoll Machine Company has under consideration the establishment of a branch plant, probably at Trenton, N. J., for the manufacture of motors and transmission, of a special design. Nothing of a definite nature has been determined upon.

The Board of Water Commissioners, Reading, Pa., will receive bids until March 19 for annual supplies and work in the Water Department. Requirements include cast iron pipe and special castings, water gates, water meters, the laying of pipes and the removal of scrap and old supply mains.

Francis Brothers & Jellett are the engineers in charge of the power and mechanical equipment in connection with the new Manufacturers Club, for which Irwin & Leighton have the general contract.

The Town Council of Lansdale, Pa., is reported considering a proposition for the construction of an entire new sewerage system and disposal plant to conform with the requirements of the State Board of Health.

The proposition to construct a tunnel connecting this city and Camden, N. J., under the Delaware River is again being given consideration by both local and Camden interests. One of the plans considered involves the construction of eight tubes, each 90 ft. wide at an estimated cost of \$8,000,000. Legal matters in connection with the proposed undertaking are now under way.

Sauer & Hahn, architects and engineers, are preparing plans for a factory building, a power house, storage house and several other buildings to be erected near Bridgeton, N. J. Electric lighting and steam heating are included. Particulars as to the nature of the proposed plant are not available.

Plans are reported in progress for a new power house to be erected at Wernersville, Pa., for the Galen Mountain Company, Galen Hall, Atlantic City, N. J. The building is to be 50 x 72 ft., one story.

Plans for the erection of a grain elevator at Girard Point, by the Pennsylvania Railroad Company, previously referred to, are going steadily forward. Specifications for it have been completed and recently submitted. While present plans provide for a 1,000,000-bushel plant, it is understood that it will be so constructed that it can be readily enlarged to a capacity of 2,000,000 bushels.

Guy King, architect, is taking bids for the erection of the Metropolitan Building to be built at Broad and Wallace streets at a cost of close to \$1,000,000. The building, which will be used for light manufacturing purposes, will be nine stories and a basement, 100 x 396 ft. It is to be of concrete construction, entirely fireproof. The plans provide for four electric passenger and four 5000-lb. capacity electric freight elevators. An initial unit of 1000-hp. power plant will be installed, as will also pressure tanks, stand pipe, hose and sprinkler system for fire protection. This proposition has been previously referred to as the Lasher Building, George F. Lasher, of this city, being largely interested in the project.

Reports in the daily press that the Federal Steel Casting Company, Chester, Pa., had taken over the plant of the old Vulcan Iron & Steel Company, adjoining its plant in that city, and would immediately occupy and equip a portion for foundry purposes have been officially denied.

Fire is reported to have destroyed the pulp keg mill of the E. I. du Pont de Nemours Powder Company, near Wilmington, Del., on March 3, together with a large quantity of stock and machinery. Detailed information is lacking.

The Baltimore & Ohio Railroad Company states that plans are being made for the various improvements to its shops at Cumberland, Md., as has been previously announced. The cost of these improvements will, however, not reach the total originally stated, but will aggregate between \$300,000 and \$400,000. The work on the proposed improvements will be started this spring.

Plans are under way for the formation of a company for the erection of a plant at Easton, Md., to manufacture carbureters for gasoline motors. W. T. Townsend and T. Huglett Henry are interested.

Chicago

CHICAGO, ILL., March 12, 1912.

A much more active week is recorded in machinery circles despite the absence of any individual orders of note. The impression prevails that the Wabash Railroad purchase, which has not yet been made, will be closed on a lump proposition rather than distributed among the various bidders. Among the machine tool builders of northern Illinois a very decided growth in the volume of business has been experienced since January 1 and at the present time most of these plants are being operated on full time. Some of the sales which have contributed to this situation include a number reported by Joseph T. Ryerson & Son. This company has furnished complete equipments for the Chicago & Alton Railroad, Bloomington, Ill.; Barnard & Leas, Moline, Ill.; Finucane Boiler Works, Houston, Texas; Oklahoma City Manual Training School, Oklahoma City, Okla., and the Denver Boiler & Iron Works, Denver, Col. The buying of individual tools by machine shops throughout the territory is reported as very good and inquiries are also noted for a considerable number of complete equipments.

The E. L. Essley Machinery Company suffered loss by fire which gutted its sales room and display store at 555 West Washington boulevard March 6. Fortunately the major portion of the stock of machine tools was carried by this company at its warehouse display room at 825 West Washington boulevard and temporarily the offices of the company will be located at this address. While handicapped by the present confusion, arrangements have been perfected for the handling of business in the regular order.

The Elgin Terminal Railway, Elgin, Ill., has been incorporated by D. C. Dunlap, C. F. Dunlap, Henry L. Rich, Robert L. McCreadie and G. A. Bergtold, all of Chicago, to build and equip a line from Elgin to Chicago and to equip terminals at both points.

The Collinsville Electric Company, Collinsville, Ill., has increased its capital stock from \$100,000 to \$200,000 for the purpose of increasing its equipment.

The Rockford Light Furniture Company, Rockford, Ill., has increased its capital stock from \$15,000 to \$25,000 for the purpose of increasing its manufacturing equipment.

J. J. Bemmer, Pawpaw, Ill., has been granted a franchise for the construction and operation of a public service electric plant and will begin construction thereof at once.

The Elgin Automatic Sewing Machine Company, Elgin, Ill., with \$100,000 capital stock, has been organized for the equipment of a plant for the manufacture of its machines. The incorporators are R. H. Rudolph, George Knolbach and A. C. Moreland.

The Globe Bauxite Company, Joliet, Ill., with Louis Lager, George N. Blatt and Francis A. Hoover as stockholders and \$50,000 capital stock has been organized to equip a plant for the mining of bauxite and aluminum ore.

The Chicago & Eastern Illinois Railroad Company has closed deals for 35,000 acres of coal lands near Hillsboro, Ill., at a cost of approximately \$3,000,000 and will proceed to develop it, establishing mining equipment, etc.

A syndicate composed of L. J. Highland, of Chicago, Ill.; M. M. Pinckly, of Bushmell, Ill.; H. A. Kaiser, of Good Hope, Ill., and others has completed arrangements for the construction at Bushmell of an electric light and power plant to cost about \$100,000, from which Bushmell and surrounding towns will be supplied with current.

The Western Pattern & Mfg. Company, Moline, Ill., with \$100,000 capital stock, has been organized by G. S. Atkinson, Edward U. Meyers and T. L. Barnes and will equip a pattern manufacturing plant at once.

The Emerson-Brantingham Company, Rockford, Ill., is preparing plans for the erection of a new foundry of steel and concrete fireproof construction. This foundry will adjoin the main plant and will be substituted for the present No. 2 foundry.

The Joliet Bridge & Iron Company, Joliet, Ill., has begun the erection of a pattern shop 40 x 100 ft. which it is expected will be completed within two months and for which new machinery is being purchased.

The Western Implement & Motor Company, Davenport, Iowa, has purchased 80 acres in that city as a site for what is planned to be a very large plant. The immediate building plans provide for the erection of an assembling building and machine shop 80 x 1000 ft. and a foundry 80 x 500 ft. The company will manufacture a patented cotton picker of which it plans to build 5000 before October 1 of this year. Patents are also controlled covering a new design of gasoline tractor. The company is laying out a new suburb adjacent to its plant site to be known as Appleby.

The A. Y. McDonald Mfg. Company, Dubuque, Iowa, has had plans prepared for a factory building, 100 x 260 ft., four stories, for the manufacture of pumps, well supplies, brass goods and plumbing specialties. The company will shortly be in the market for its equipment.

The Baker Mfg. Company, Fort Dodge, Ia., is about to erect a four-story manufacturing building of concrete construction.

The Mangan Iron & Steel Company, Duluth, Minn., has been incorporated with a capital stock of \$500,000 by Charles C. Teare, Patrick Hammel and N. J. Miller, all of Duluth.

The Milwaukee Lace Paper Company, Milwaukee, Wis., through Herman J. Esser, architect, is receiving estimates for the construction of a fireproof reinforced concrete factory building, 82 x 137 ft. and five stories.

The J. C. Iverson Company, Milwaukee, Wis., is preparing to erect a manufacturing building of brick and concrete construction, 80 x 200 ft., at Twenty-fifth and St. Paul avenues.

The Rockford Desk Company, Rockford, Ill., whose plant was destroyed recently by fire, is about to begin the erection of new buildings on the site of the former plant.

The Crane Company, Chicago, has taken out a building permit for a one-story brick boiler house to be 30 x 46 ft., and located on North Desplaines street.

The Warren C. Rude Mfg. Company, Crothersville, Ind., recently mentioned as having been incorporated, has had plans prepared for the erection of a factory building, 70 x 150 ft. James M. Rude is president of the company.

Columbus, Ind., is considering issuing \$75,000 of bonds for the purpose of making improvements to its water plant, including the installation of a filtration system.

The New Albany Mfg. Company, New Albany, Ind., reports an improved demand for cut-stone machinery. The stone trade is getting a good volume of business, and is in good condition, so that the machinery men interested in this trade are hopeful of correspondingly favorable conditions.

The John A. Rowe Cut Stone Company, Bedford, Ind., the plant of which was recently burned, is now ready to receive bids on the erection of a new building on the old site. The structure will be of steel and brick, several hundred tons of material being required. Comparatively little new machinery will be purchased, as it has been found possible to utilize the old. The building will be T-shaped, and will be 47 x 120 ft. at one end and 57 x 176 ft. at the other.

Cleveland

CLEVELAND, OHIO, March 12, 1912.

The volume of orders taken by local machine tool dealers in the past week has been quite satisfactory, the total business being an improvement over the previous two or three weeks. One local dealer took an order for about \$15,000 worth of machinery from a central Ohio manufacturer and there was a fair volume of business in small orders, these being mostly for single tools. No new inquiries of much size have developed, but several came out for lots of from three to five tools. Builders of most lines of machine tools note an improvement in business. Drilling machines are moving fairly well, some good orders having recently come from Canadian sources. The demand for forging machinery is more active. Makers of cranes are getting a fair volume of orders and inquiries. New inquiries have recently come out for steel plant equipment, water wheels and mining machinery. The outlook in general machinery lines is regarded as quite satisfactory.

Railroads are buying single tools more freely and some of the Canadian roads are expected to be in the market shortly with good sized lists.

The Dayton Engineering Laboratories, Dayton, Ohio, placed orders last week with a Cleveland machinery house for from 15 to 20 machine tools, aggregating about \$15,000. The orders included drilling, automatic and milling machines.

Specifications for the principal equipment for the new municipal lighting plant in Cleveland have been completed by F. W. Ballard, the engineer appointed by the city to design the plant. There will be three 5000-kw. turbines with condensers, 7000 hp. in boilers and 25,000 sq. ft. of economizers. It is expected that bids for the required electrical equipment will be received late in April. The contract for the building will be let later.

The Grant-Lees Machine Company, Cleveland, Ohio, which recently began the manufacture of automobiles, has commenced the erection of a new plant on Ivanhoe Road, East Cleveland, to be used for its motor car department. Two one-story buildings will be erected, one 100x400 ft. and one 150x600 ft. The buildings will be of reinforced concrete with Fenestra metal window sash. The company expects to install a steam power plant of 150 to 175 hp. direct connected. Some machinery will be required, but this will not be purchased until the plant is completed. A portion of the machinery equipment will be removed from the present plant on Quincy avenue. The company will continue to operate the latter plant for the manufacture of gears and other automobile parts.

The Porcupine Water Heater Company, Cleveland, has been incorporated with a capital stock of \$10,000 to put on the market a new water heater for domestic purposes and small heating boilers. J. F. Jones will be general manager and secretary of the company. Its headquarters will be at 11,109 Superior avenue. The company's products will probably be made by contract.

B. F. Klein, owner of the Gas Fixture & Brass Company, Cleveland, has purchased the plant of the United Brass Mfg. Company, Cleveland. The latter plant will be run under its present name and will continue under the management of William J. Schoenberger. Its products are plumbers' brass goods.

The Osborn Engineering Company, Cleveland, will move April 1 from its present quarters in the Osborn Building to a larger suite of rooms on the seventh floor of the Engineers Building.

The Allyne Brass Foundry Company, Cleveland, which recently increased its capital stock from \$50,000 to \$125,000, announces that the larger capital is provided to care for an increase in business but that nothing in the way of factory extensions is contemplated.

The Economy Tool & Specialty Company, Cleveland, has been organized with a capital stock of \$3,000 by H. J. Owens, Fred. W. Stoll and others to operate a machine shop.

The Wise-Harold Electrical Company, New Philadelphia, Ohio, has been incorporated with a capital stock of \$30,000 by W. J. Wise, H. H. Harold and others.

The village of Navarre will sell bonds in the sum of \$25,000 to provide funds for the construction of a water works system.

It is reported from Orville, Ohio, that the Ohio Wood Preserving Company, Pittsburgh, will erect a \$75,000 plant just east of that city.

At a meeting of the stockholders of the Troy Foundry Company, Troy, Ohio, new officers were elected as follows: President and manager, E. E. Thompson; vice-

president, R. W. Crowfoot; secretary, James Blevin; treasurer, Otto Smith. Messrs. Crowfoot, Thompson, Smith and Blevin are new members of the board of directors. The company will let contracts shortly for the erection of a new plant.

Through the efforts of the Commercial Club of Galion, Ohio, it is announced that a new automobile plant will be established in that city under the name of the Cleveland-Galion Motor Truck Company. In order to secure this plant the citizens of Galion have subscribed for \$76,500 in stock of the company. It is planned to have a company with a capital stock of \$500,000.

The Alliance Board of Trade, Alliance, Ohio, has closed a contract with the Davies Mfg. Company according to the terms of which that company will locate in Alliance and build a factory for the manufacture of an airless automobile tire in which springs are used to furnish the buoyancy, pressed steel automobile parts and other automobile accessories. A site has been provided near the plant of the Transue-Williams Company. Plans are being made for a factory building 50 x 200 ft. It is stated that two other buildings of the same dimensions will be erected later. The officers of the company are C. H. Davies, Detroit, president; George R. Nash, Detroit, secretary and treasurer. Its capital stock is \$150,000.

Cincinnati

CINCINNATI, OHIO, March 12, 1912.

The Cincinnati trade is figuring on the export inquiry for about 160 lathes of various sizes which recently came from Belgium. The list is from a motor car manufacturing company and it is understood that the business is to be closed at an early date.

Domestic business continues quiet, and reports from many machine tool builders indicate rather spotty conditions. One large concern is operating on overtime and with a full force, but of all the Cincinnati manufacturers this company is the exception.

The jobbing foundry business is not promising. Those catering to the machinery trade, as a rule, find their customers reluctant to make long time contracts and consequently they are unable to make stock castings in anticipation of the wants of the machinery trade.

Henry Ritter, president of the Cincinnati Branch, National Metal Trades Association; J. M. Manley, a former secretary, and Ben Sebastian are in Washington to appear before the Committee on Education and Labor of the Senate to protest against the passage of the eight-hour bill. This committee represents the local branch of the Metal Trades Association, whose members have begun to realize the harmful effects of the bill on manufacturing industries if passed in its present form.

The Verdin, Kappes & Verdin Company, Cincinnati, heretofore doing business under a partnership arrangement, has been incorporated with \$25,000 capital stock. The incorporators are W. H. Kappes, L. T. Verdin, H. A. Bolsinger, Eugene Adler and John Bolsinger. The company is a manufacturer and dealer in metal working machinery and expects to make some extensions later on.

The American Rolling Mill Company, Middletown, Ohio, has opened a branch office in St. Louis in the New Bank of Commerce Building.

The large plant of the M. B. Farrin Lumber Company, at Winton place, Cincinnati, was almost totally destroyed by fire March 7. The loss was covered by insurance and it is understood that the company will rebuild the burned part of the factory without delay.

Bert L. Baldwin, Perin Building, Cincinnati, has contract for an extensive addition to the plant of the Warner Elevator Company on Spring Grove avenue.

The city of Newport, Ky., contemplates the installation of a large filtration plant. The City Commissioners have also appointed a committee to investigate the feasibility of establishing a municipal lighting plant in connection with the present pumping station owned by the city.

The Board of Hospital Commissioners, Cincinnati, Ohio, will open bids April 16 for the heating, ventilating and vacuum systems to be installed in the large new hospital buildings now under construction. Considerable other special equipment will be required. Plans may be seen at the office of Samuel Hannaford & Sons, architects, Hurlburt block.

The Modern Machine Tool Company, Winton place, Cincinnati, has practically finished the installation of all of its equipment and expects to be in full operation within the next few days.

Columbus

COLUMBUS, OHIO, March 12, 1912.

In a number of manufacturing lines conditions show some improvement over the past few weeks. The export field is a very remunerative one for several local firms who have cultivated that particular trade. Domestic business, in all lines, is also in better shape, though it is not up to the usual standard. Indications point to a busy spring and summer season.

The American Well & Prospecting Company, Corsicana, Texas, and Bartlesville, Okla., has, through the efforts of the Columbus Chamber of Commerce, decided to consolidate both its plants and remove to Columbus. This company manufactures oil well drilling and pumping machinery, and has a large business in the oil fields of California, Mexico and Texas. President H. G. Johnston spent considerable time investigating various propositions submitted by cities in the north, and finally decided that the advantages Columbus had to offer were superior to those of any other city.

A site of 12 acres in the southeastern part of the city has been selected, and work on the buildings will be commenced as soon as weather conditions will permit. Considerable new machinery equipment will be required.

A proposition is on foot to establish a civic center which will take in the entire block immediately east of the State Capitol, whereon will be erected a new City Hall, State Office Buildings, Gallery of Fine Arts and Administration Building for the Board of Education. The question of issuing \$350,000 in bonds to purchase a portion of the property will be submitted to the voters May 21. As the people generally seem very favorably disposed towards the project, the bond issue will doubtless be authorized.

The Chamber of Commerce has issued a book of more than 100 pages for general distribution, entitled "What You Want and Where to Get It." This book gives a list of every article manufactured in Columbus, and has created much favorable comment.

The Kilbourne & Jacobs Mfg. Company has plans under way for an extension to its plant. The new addition will be about 100 x 200 ft., one story, and of steel and concrete construction. Much of the equipment has not yet been bought.

The Smith Shoe Company has had plans prepared by Richards, McCarty & Bulford, Columbus architects, for a nine-story manufacturing building that will cost about \$150,000. Work is expected to begin on the proposed structure as soon as the spring season opens up.

The John W. Brown Mfg. Company, manufacturer of automobile lamps, has increased its capital stock from \$125,000 to \$150,000, and it is rumored some extensions to its plant will be made at an early date.

Hamilton

HAMILTON, OHIO, March 12, 1912.

Hamilton machine tool builders and manufacturers in other machinery lines report increased orders in February and a generally better outlook. The foundrymen of this city state that the melt is normal and that a good spring business is indicated. The Black-Clawson Company observes a tendency among foundrymen to quietly increase their purchases of iron, indicating a belief in an early improvement in demand. The machine tool makers are somewhat disturbed by the threatened removal of the tariff on machine tools. Excessive legislative disturbance is regarded as a retarding factor, but the opinion prevails that a reasonably satisfactory adjustment and more stable conditions are not far distant.

The Kern Machine Tool Company is engaged in the installation of a new 65 hp. gas engine as a prime mover for its plant. It will discontinue the use of steam entirely. Business with this company showed a marked improvement in February and it feels that 1912 will, as a whole, prove much more satisfactory than 1911.

The Hooven-Owens-Rentschler Company operated with a fair volume of business in February. Inquiries indicate more active conditions in 1912 than have prevailed for some time past.

The Republic Motor Car Company is now occupying its new plant and will double its output for 1912.

One of the largest gas power installations ever made in Hamilton will be completed soon at the plant of Shuler & Benninghofen, proprietors of the Miami Woolen Mills. An order has been placed for a 200-hp. twin engine, to employ natural gas as a motive power. Business with this company continues active, despite the fact that tariff agitation has disturbed the woolen

business as a whole. The additions to this company's plant will be completed early in the spring.

The new plant of the Anderson Tool Company, recently removed here from Anderson, Ind., will be in full operation within 90 days. Since its decision to remove after the destruction of its Anderson plant on January 26 this company has enjoyed the greatest volume of orders in its history. Every energy is being applied to the early restoration of its manufacturing facilities.

The new plant of the Eagle Woodenware Mfg. Company, formerly of Circleville, Ohio, will be in operation within the next ten days.

The Hamilton Chamber of Commerce reports active negotiations for the location of two well-established industries in this city. One is now located in Michigan and the other is a branch of an important Ohio concern.

The New Columbia Carriage Company, which recently took over the plant of the Columbia Carriage Company, is now operating it to its fullest capacity, and the outlook for midsummer and fall business is very good. The new company has perfected new designs for storm vehicles, and the body factory is finishing them up in great number.

The Black-Clawson Company is building two of the largest fast-running Fourdrinier paper machines ever constructed in America for the Lake Superior Paper Company, Ltd., of Sault Ste. Marie, Mich. The company built two additions to its plant in 1911 and reports the outlook for 1912 as good.

Detroit

DETROIT, MICH., March 12, 1912.

The aggregate of orders booked by local machinery dealers the past week has amounted to a very respectable total, although the great majority of sales have been of one or two tools. There has been, also, a very satisfactory movement in second hand machinery, which has helped to make the improvement in business more noticeable. Inquiries show more life and embrace requirements for widely diversified industries. Manufacturing machinists are booking a good volume of business in special equipment. Municipal business which has been very light for some time is expected to receive a decided impetus through the submission of a considerable number of water works and electric light plant propositions at the spring elections to be held April 1. Electrical equipment which has been quiet for some time is in more active demand and some very good business in this line is now pending.

The Aluminum Castings Company has awarded contracts for the erection of a three-story brick addition to its foundry building at its present plant on Chene street. Some special equipment will probably be required.

The Detroit Agricultural Iron Company has acquired a factory, 50 x 150 ft., at Twenty-third and E streets. Information as to the mechanical requirements of the company is not available.

The Baird Machine & Mfg. Company, maker of special machinery and engines, has increased its capital stock from \$15,000 to \$25,000 and has changed its name to the Superior Machine & Engineering Company.

The Detroit Forging Company has awarded contracts for the rebuilding of its plant, which was recently destroyed by fire.

The Solvay Process Company, operating a soda ash and coke making plant at Delray, a Detroit suburb, is planning the addition of 40 coke ovens to its equipment, raising the total to 170 and involving the expenditure of \$500,000.

The Keeton Motor Company has been organized with a capital stock of \$10,000 by William W. Wuchter, Wilber Brotherton and Forrest M. Keeton. The company will engage in the manufacture of automobiles and accessories.

The Detroit Electric Heater Company has been incorporated with \$50,000 capital stock by Samuel C. Mumford, Arthur H. Hoppe and Albert H. Raymond, for the manufacture of electrical appliances.

The United States Starter Corporation has been incorporated with \$10,000 capital stock to manufacture and deal in motor starters and other automobile accessories. The incorporators are Jacob G. Merithew, Frank S. Salter and William A. Staley.

The Mt. Clemens Sugar Company, Mt. Clemens, Mich., operating a beet sugar factory in that city, is preparing plans for an enlargement to its plant and equipment which will increase its capacity to 1000 tons annually.

The Wolverine Sand & Gravel Company, Detroit, has purchased a large tract of gravel-land near Oxford,

Mich., and will install a gravel washer plant at an estimated cost of \$15,000.

The Cliffs Chemical Company, a subsidiary of the Cleveland-Cliffs Iron Company, has begun the construction of a large chemical plant at Goodman, Mich. Grant T. Stephenson is the engineer in charge.

The South

LOUISVILLE, Ky., March 12, 1912.

Business in this market has shown some improvement in the past week, and manufacturers and dealers appear to be well pleased with the prospects. The only complaint is that there is more than ordinary competition for orders, and that this is having the effect of hammering down prices. The weather has begun to approach normal conditions, and this is expected to have a good effect. Indications are that the approaching building season will be good in point of volume, and those interested in the sale of quarrying and stone-cutting machinery, contractors' equipment, etc., are feeling optimistic on that account. Power equipment continues to lead in the demand.

The Dow Wire & Iron Works, Louisville, has increased its capital stock from \$60,000 to \$100,000. The company will make no changes in its plant, but will use the increased amount as working capital. The business of the ornamental and structural iron department is being developed.

The Louisville Board of Education has let a contract for a boiler-room lift to the Abell Elevator Company, Louisville. The board is now making up a list of the equipment it will purchase during the summer, and will have this ready in about a month. Sam D. Jones is business director.

Varble & Frazier, real estate dealers of Louisville, have announced that plans for a twelve-story office building to be erected at Fifth and Walnut streets have been completed by Joseph & Joseph, Louisville architects. It will be a steel frame structure, and will cost \$300,000. Chicago capital will finance the project.

Hildebrand & Boone, Louisville, have begun the erection of an ice factory. The contract for the ice-making equipment has been let to the Henry Vogt Machine Company, Louisville. The plant will have a daily capacity of 30 tons.

Edmund H. Anderson, Nicholasville, Ky., will erect an electric light plant and ice factory at Crab Orchard Springs, Ky. He intends to build a central steam heating plant there later on.

Waverly, Ky., is arranging for the installation of an electric light plant.

Murray, Ky., has completed the sale of \$25,000 of bonds recently authorized and is now ready to let contracts for the construction of a water-works system. The municipality is also considering the erection of a municipal lighting plant.

A company is being organized at Williamsburg, Ky., for the erection of a canning factory.

The development of water power on the Dix River, near Danville, Ky., is said to be assured. Arthur Geisel, a well-known engineer, has been making surveys. The exact identity of those who will finance the undertaking has not been made known. The proposed dam will be 200 ft. high. Danville, Harrodsburg, Nicholasville and other Central Kentucky towns are to be served.

The Convertible Furnace Company, Covington, Ky., has been incorporated with \$2,000 capital stock by Frederick J. Parker, D. C. Shaffer and George Gorman.

The Forman-Earl Lumber Company, Heidelberg, Ky., is in the market for wood-working machinery and power equipment. Its large sawmill was burned last week with a loss of over \$30,000, covered by insurance. The machine shop was not damaged, but the sawmill and boiler-room were destroyed. Thomas Forman, president of the company, is arranging to purchase equipment and resume operations as soon as possible.

The executive committee of the Burley Tobacco Society, Lexington, Ky., is now considering sites for a tobacco factory to be erected in the near future.

The Reliance Textile & Dye Works, Covington, Ky., is reported to be considering removing to another city and enlarging its plant. L. S. Doggett is secretary and treasurer.

The Danville Ice & Coal Company, Danville, Ky., has announced plans for doubling the capacity of its ice factory.

The Harris Limestone Company, Glasgow, Ky., has been organized with \$10,000 capital stock by A. L. Harris, George R. Lewis and others, and is installing machinery for the manufacture of lime, road material, fertilizer and other products. Mr. Harris is president of the company.

Carrollton, Ky., is in the market for a new pump

to be installed in the water-works. William Bergen is city clerk. Bids will be received about April 1.

J. W. Rider, Mt. Vernon, Ky., is asking for quotations on a hydraulic pump.

Hardin, Ky., is in the market for a concrete mixer to be used in street construction. L. C. Stark is mayor.

The E. E. Sutherland Medicine Company, Paducah, Ky., has let a contract for the erection of a new factory building to G. T. Mayes & Co., Oklahoma City, Okla. A good deal of equipment, including motors, elevators, etc., will be required.

The Cromwell Milling Company, Cromwell, Ky., is in the market for a 32-hp. gasoline engine.

The English Mahogany Company, Itta Bena, Miss., door manufacturer, is reported to be contemplating erecting a factory in Nashville, Tenn.

St. Louis

ST. LOUIS, Mo., March 11, 1912.

There is a slight lessening of the demand for machine tools in this territory, although the dealers do not look upon it as more than a temporary condition which is not likely to be the precursor of more serious developments. The trade continues chiefly in single tools and there are no large lists on the market save that of the Wabash Railroad which is for the replacement of equipment in various repair and machine shops of the system. There is some request for second hand tools and dealers also report collections good.

Pine Bluff, Ark., business men have arranged for the construction and equipment of a large cotton compress at that point which will include a Webb compress of the largest type as well as other equipment. The stockholders are chiefly former stockholders of the St. Louis Cotton Compress Company, who have sold their holdings received when two Pine Bluff plants were merged with the St. Louis company. About \$100,000 is involved in the new investment.

The Yellow Jacket Mining Company, Kansas City, Mo., has been incorporated with \$48,000 capital stock by D. A. Mansur, O. W. Sparks, W. F. Scott and J. T. Lafferty to equip and operate property owned by the stockholders.

The Independent Electrical Supply Company, St. Louis, has been incorporated with \$100,000 capital stock by R. A. Sevens, Felix Cormitus and Joseph Mayer, to manufacture and distribute electrical apparatus.

The Ruch Corrugated Paper Box Company, St. Louis, with a \$20,000 capital stock, has been organized by Martin and T. A. Ruch and E. A. Clarke and will equip a plant for the manufacture of paper boxes.

The Wilson Steel Range Company, with \$50,000 capital, has been incorporated at Belleville, Ill., by James Wilson, Gottlieb Klémme, William Schlott, J. A. Schwartz, Jr., and James A. Sutherland and will equip a plant, with foundry, for the manufacture of stoves.

The Rees Farmers' Elevator Company, Rees, Ill., has been incorporated with \$65,000 capital stock and will equip a grain elevator at once. The incorporators are Charles D. Ransdell, Dennis Whalen and W. E. Douglas.

The Thoene-Barth Chemical & Mfg. Company, East St. Louis, Ill., has been organized with \$50,000 capital stock by John M. Barth, Herman C. Thoene and Albert C. Jones to equip a manufacturing plant for the production of specialties.

The Acme Machine Works, St. Louis, has been incorporated with \$60,000 capital stock by J. W. Ellebrecht, F. and M. Boercker, to establish a machine manufacturing plant.

The Camden Copper Company, St. Louis, with \$100,000 capital stock, has been incorporated by George M. Heath, M. H. Wolfe, E. W. Schoenfeld and B. Leopold, to operate and equip mining properties owned by the organizers of the company.

The Cushman Mfg. Company, St. Joseph, Mo., with \$75,000 capital stock, has been organized by L. W. and E. Cushman and Henry J. Weber, and will equip a manufacturing plant at once.

The St. Louis & Jennings Street Railway Company, operating an electric line into a suburb of St. Louis, has arranged a bond issue of \$100,000 for the purpose of extending the line and also equipping a plant for the supply of current for lighting and power purposes.

The city of Springfield, Mo., has completed the sale of \$100,000 of bonds for the purpose of extending its sewage and water service equipment.

At an election in April, Wellsville, Mo., will vote on a proposition to issue bonds for the installation of a water works plant, to be municipally operated. Engineers are already making the preliminary plans.

Texas

AUSTIN, TEXAS, March 9, 1912.

An unusual amount of activity in electrical development is reported. Besides the construction of many miles of new interurban electric railroads there are on foot several hydroelectric power plant projects which involve the use of large quantities of machinery and equipment. Irrigation enterprises continue to receive much attention, and the demand for pumping machinery is constantly increasing. More good rains have fallen over practically all of the State, thus enhancing the prospects for a good crop season.

The La Pryor Irrigation Company, San Antonio, will construct a large system of irrigation in that section. It has a capital stock of \$100,000. The incorporators are A. R. Helzschuer, F. R. Young, G. G. White of San Antonio, James U. G. La Pryor and E. A. Hutchins of Columbus.

The Guadalupe Water Power Company of Seguin, which was recently formed with a capital stock of \$600,000, will construct a series of dams and hydroelectric plants on the Guadalupe River between that place and New Braunfels. Among those interested are Walter J. Crawford, W. B. Dunlap of Beaumont, E. W. Brown of Orange, J. M. Abbot and F. C. Weinert of Seguin.

The Gunter Water Supply Company, Gunter, has been formed with a capital stock of \$5,175. The incorporators are J. D. Bowen, H. J. Barnes, W. J. Wall, and others.

L. A. Knight is interested in a proposition to establish a factory at Plainview for the manufacture of a variety of products from alfalfa.

The Cuero Light & Power Company, Cuero, will make improvements to its plant. At its recent annual meeting of directors the following officers were elected: Wm. Ratcliff, president; Walter Reiffert, vice-president; Jos. Sheridan, secretary.

Charles F. Hoff has applied to the City Council of Rockport for a franchise for a waterworks plant and distributing system. He will also install a cotton gin there.

The Arizona Oil Company, Houston, has been formed with a capital stock of \$30,000. The incorporators are W. N. Bullard, S. H. Jackson and J. D. Carroll.

The Pearsall B. & H. Pear Burner Company, Pearsall, has been formed with a capital stock of \$1,750,000. It will manufacture prickly pear burners. The incorporators are R. L. Brown, J. A. Carter and R. S. Nixon.

A. E. Hencirhsen of Boelus, Neb., will establish a plant at Alice, Texas, for the manufacture of concrete building blocks.

J. Dull and B. J. Ney of Terrell are preparing to move their large machine and repair shops and iron foundry to Temple.

The Gulf, Colorado & Santa Fé Railway Company will spend approximately \$1,125,000 in betterments and improvements in Texas in the present year, according to announcement of the provision made in the annual budget. This sum will be divided as follows: Terminal yards, \$326,000; protection of banks and grade revisions, \$133,000; track fastenings and appurtenances, \$123,000; water and fuel stations, \$117,000; new rails, \$75,000; bridges, trestles and culverts, \$61,000; elimination of grade crossings, \$55,000; block and other signal apparatus, \$7,000; station buildings and fixtures, \$88,000; engine houses and turntables, \$59,000. Considerable new ship machinery will be purchased.

The Board of City Commissioners has submitted to the taxpayers of Dallas the proposition of issuing \$1,300,000 of bonds divided as follows: For waterworks and improvements, \$400,000; sanitary sewers, \$100,000; city hall, \$475,000; schools, \$200,000; fire stations, \$125,000.

The Hindman-Barlow-Scott Oil Company has been formed at Houston with a capital stock of \$20,000. The incorporators are S. J. Hindman, R. T. Barlow, F. H. Scott and others.

The Clark Land Company, Roswell, N. M., has let the contract to Irwin & Son for the construction of a large reinforced concrete dam near Red Bluff for the purpose of providing a water storage supply for irrigating a large tract of land.

The Gold Canon Mining Company will install a large pump and other machinery upon its placer property near Montana, Ariz. P. J. McIntyre of Los Angeles, Cal., is manager.

The Graham County Copper Company will install a new hoisting plant and an air compressor at its mines near Cedar Springs, Ariz. W. C. Rohans, Detroit, Mich., is general manager.

The Pacific Coast

SAN FRANCISCO, CAL., March 5, 1912.

The California machinery market has suffered a serious reaction, owing to the dry weather which prevailed throughout February. Some rain has fallen this week, but the crop outlook is still very uncertain and buyers in most lines are keeping out of the market until conditions are more definitely known. This applies to machine tools as well as other classes of equipment, sales of new tools being small and scattered. A number of buyers who have been in the market have found second hand tools to fill their requirements and offerings of second hand tools are large enough to interfere with new business for some time to come, the needs of most local shops being easily filled by this class of equipment. Railroad inquiries, which were expected with confidence, have been held up in the Eastern offices and local agents look for little business from this source in the immediate future.

The principal exceptions to the general dullness are pumping machinery and gas engines, the demand for the former being altogether without precedent. Irrigating pumps are being installed to offset the effects of the dry year in all parts of the State and many orders have been taken for pumps for mines and industrial plants. Several local manufacturers of pumps and gas engines are working at full capacity and may soon be in the market for a few special tools.

T. H. Brooks, formerly with the Risdon Iron Works and lately with the Union Iron Works, has formed a partnership with W. E. Mushet to represent Eastern lines of mining machinery, steam plant equipment, etc. Offices have been taken in the Hooker & Lent Building.

The Hammer-Bray Company, Oakland, Cal., has installed some new machinery for the manufacture of sheet metal products.

George E. Dow, head of the George E. Dow Pumping Engine Company, is now in Europe to study the manufacture of Diesel engines. He is interested in a concern recently organized here for the manufacture of this type of engine.

The Alameda Sugar Company is taking figures on a new plant to be installed at Meridian, Cal.

The Universal Light & Power Company is preparing to install a new power plant at First and Brannan streets, this city.

The Pacific Coast Steamship Company will open bids March 20 for the construction of a large steamer, on which several Pacific coast firms are expected to present bids.

The Western States Gas & Electric Company has about completed arrangements for the installation of a large power plant at Eureka, Cal.

The California Steel Ceiling Company is putting up a new factory for general sheet metal work, stamping, etc., at Los Angeles.

The Star Drilling Machinery Company, Los Angeles, has purchased a large factory site on the harbor at Long Beach, Cal., where new shops will be erected.

The California State Harbor Board is having plans prepared for the installation of oil-burning devices in all steam equipment under its charge. The change will affect tugs, dredges and the Ferry Building heating plant and will cost about \$11,000.

Plans for piers 30 and 32 on the local water front, which will soon be up for figures, include the installation of eight electric cranes and a number of electric conveyors.

The General Machinery Mfg. Company, Los Angeles, Cal., has been incorporated with a capital stock of \$25,000 by W. N. Brassington, G. T. and C. J. Stoneham.

The city of San Diego, Cal., is considering the purchase of a dredge for harbor work.

The town of Santa Ana, Cal., is taking bids on a new pumping unit.

New planing mills are being installed by George A. Wright, Lindsay, Cal., and Marcus Campbell, Long Beach, Cal. The machinery for both plants has been purchased at Los Angeles.

The Adinau Powder Company, recently organized in this city, is planning to install a factory in San Mateo County, Cal.

The equipment of the new plant of the Pacific Gas & Electric Company at Sacramento, Cal., will include two steam turbine units with an aggregate capacity of 12,500 kw., seven 1500-kw. transformers, six boilers, condenser, etc.

Moreing Bros., operating a gravel screening plant at Tesla, Cal., are preparing to double the capacity of their equipment.

It is reported that the Paraffine Paint Company, which recently purchased the California Paper & Board Mills, Antioch, Cal., will put in a lot of new machinery.

The San Diego Vitrified Brick & Clay Products Company, San Diego, Cal., will shortly install a large brick and pottery plant.

The Llewellyn Iron Works, Los Angeles, Cal., has the elevator contract for the new Times Building, that city.

Elevators in the Garland Building, Los Angeles, will be installed by the Otis Elevator Company for \$11,455.

The city of Los Angeles is taking bids on a 150-hp electric motor.

The Southern Pacific Railroad, which now operates its suburban lines in Oakland, Alameda and Berkeley by electricity, is planning to extend the electrification from Berkeley to Richmond and from Oakland to Niles, Cal.

The Montana-Tonopah Mining Company, which has acquired the Commonwealth mine at Pierce, Ariz., is figuring with Los Angeles firms for the installation of a mill at that place at an estimated cost of \$250,000.

Eastern Canada

TORONTO, ONT., March 9, 1912.

The announcement of enlargements of plants in many cases and of the starting of new companies for manufacturing operations are an indication of how the outlook is regarded for the season that will open up with the beginning of spring. The coal shortage is not so vexatious as it was a fortnight ago, as deliveries are being made more freely, the state of the railroad service having been improved by the moderation of the weather. Still there are urgent appeals from manufacturers for more prompt service. In the railroad yards at Bridgeport, Black Rock and East Buffalo thousands of earloads of coal are tied up, and loud complaints come from St. Catharines, Merriton and other Ontario manufacturing towns near the border because of the backwardness of the supply. Relief has been sought by endeavors to bring about the introduction of the Dominion Board of Railway Commissioners. Factories there may have to shut down if there are not better coal deliveries. It is intimated that the railroads are favoring themselves in the distribution.

In the supplementary estimates of the Ontario government provision is made for \$2,000,000 on capital account, the money to be expended on new construction of the Hydro-Electric Power Commission.

In the past year there were incorporated in Quebec Province 19 pulp, paper and lumber companies, with a total capitalization of \$49,709,000. In addition another pulp and paper company was reorganized and increased its capital stock by \$10,000,000.

The Crocker-Wheeler Company, St. Catharines, Ont., proposes to build a \$60,000 addition to its factory.

The Canada Brush Company, a corporation with \$100,000 capital stock, is preparing to start operations in St. Johns, N. D.

The Martin-Orme Piano Company, Ottawa, will make extensive additions to its factory.

The Canada Furniture Company will enlarge its factory at Berlin, Ont., by an addition to cost \$35,000.

It is rumored that the Page-Hersy Iron, Tube & Lead Company, Welland, Ont., is contemplating a number of additions to its factories to be made early this spring. The firm spent nearly \$500,000 last year in improvements and additions.

The *Herald* of Hamilton, Ont., says that D. A. McIlroy, formerly of the Hamilton Bridge Company, is promoting a new steel company in that city, and that the erection of the plant may soon be begun.

Notice appears in the *Ontario Gazette* of supplementary letters patent authorizing the Russell Motor Car Company, Toronto, to increase its capital stock from \$1,600,000 to \$2,000,000.

It is rumored that the British-Canadian Cannery, Ltd., Hamilton, Ont., which is building canning factories at Bowmanville, Cobourg, Port Robinson, Highgate and Merlin, intends to erect a large tin can manufacturing plant in the east end of Toronto to cost about \$100,000.

Crowe's Iron Works, Guelph, Ont., will enlarge its plant.

The Stewart Sheaf Loader Company, Winnipeg, has taken up its option on an 85-acre site in the vicinity of Guelph, Ont., where it proposes to establish large works.

The Hare Engineering Company has purchased land on which to build works at Guelph, Ont.

The Hamilton Bridge Works Company, Hamilton, Ont., it is said, will spend about \$250,000 this year in

making extensions to its plant. It purchased ground for a plant in the east end last year, and will make additions there.

Western Canada

WINNIPEG, MAN., March 7, 1912.

The outlook continues very favorable for the immediate future. It is too early in the season to expect much actual activity in the matter of construction work, but many companies are briskly preparing for considerable extension to plants, and as reported previously quite a few new concerns recently organized will establish new plants of various kinds throughout the West.

P. H. Rice, manager of the Rice Malting Company, Winnipeg, has been in Lethbridge, Alberta, negotiating for the establishing of a branch plant there, and it is likely that satisfactory arrangements will be made.

The Canadian Northern Railway has entered into contracts with the Barnett & McQueen Construction Company for extensive additions to the grain elevators at Port Arthur. Work will start about May 1.

It is announced that the Canadian Pacific Railway will enlarge elevator D at Fort William, and also is likely to erect a \$2,000,000 hospital for cleaning damaged grain at the head of the lakes.

One of the provisions of the new grain bill being framed by the Federal Government provides for the establishment of a terminal elevator at Fort William. It has not been decided, however, whether one will be built or leased from some company.

The Saskatchewan Cooperative Elevator Company, Ltd., will erect grain elevators at several new stations along the line of the Grand Trunk Pacific Railway this spring.

The Creston Trading Company, Ltd., Cranbrook, B. C., has been incorporated with a capital stock of \$50,000 to build and operate a flour mill and grain elevators.

The factory of the Nelson Sash & Door Company, Winnipeg, was recently burned and will have to be replaced as soon as possible, as the company has orders on hand to the extent of about \$300,000 for this coming season.

The Pacific Electric Heating Company, Ltd., 615 Hastings street, West, Vancouver, B. C., has been incorporated with a capital stock of \$100,000 to manufacture and deal in all kinds of electrical devices and appliances. R. R. McCrea is the company's attorney.

Preparations are under way for a six or eight-story office building in Edmonton, Alberta, for the Canadian Pacific Railway.

Information may be had from Oldfield, Kirby & Gardiner, Winnipeg, regarding a contemplated large office building in this city for an English syndicate.

The Council of Kindersley, Saskatchewan, has decided to go ahead with the establishment of a waterworks system, to cost about \$50,000.

A by-law will shortly be submitted in South Vancouver, B. C., to spend \$300,000 on waterworks.

The Port Arthur Wagon Company, Port Arthur, Ont., will begin operations in about a week.

Edmonton, Alberta, will spend \$57,000 on new street car barns.

The Canadian Northern Railway Company has taken out a permit for additions to its coal-handling plant at Port Arthur, Ont., to cost \$280,000.

The *Daily News* of Port Arthur, Ont., says that the Canadian Northern Railway Company has entered into contracts with the Barnett & McQueen Company for extensions to its elevators there that will bring up their capacity to 24,000,000 bushels.

The Canadian Pacific Railway Company has concluded to add \$200,000 more to the \$1,000,000 it is expending on coal docks at Island No. 1, Fort William, Ont. It will spend \$150,000 on a freight shed upon the island. A steel dock to hold 100,000 tons of steel is also to be built there by the company.

More than \$1,000,000 is to be expended this year in doubling the capacity of the pulp mill on Powell River, according to M. J. Scanlon of Minneapolis, who is head of the Powell River Company. Mr. Scanlon is reported as having said that the additional investment before the plant has reached the size contemplated may reach several million dollars.

With plans partially completed for the construction at a cost of \$300,000 of a pulp and paper mill, C. B. Pride, a financier from Spokane and president of a pulp and paper mill at Tomahawk, Wis., interviewed the council of the Board of Trade of Nelson, B. C., with the idea of obtaining the support of the board in securing a site and cheaper power.

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